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Tomato Production Fertilization Guide

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Pre-plant

Take a soil sample, representative of the area where tomatoes will be planted, and submit it to the NCDA&CS soil lab for lime and fertilizer recommendations.

Nitrogen (N): Apply 40 to 60 lb/acre.
40 lb/acre is suitable for soil with either high CEC and organic matter or soil with high residual N.
60 lb/acre is suitable for soil with low CEC and low organic matter.

Phosphorus (P): Follow NCDA&CS recommendation from soil analysis.

Potassium (K): Follow NCDA&CS recommendation from soil analysis.

Calcium (Ca): Lime soils to 6.5 for mineral soils, 5.5 for mineral-organic, and 5.0 for organic (follow NCDA&CS soil analysis lime recommendation). Add 300 to 500 lb/acre of gypsum to provide additional Ca throughout growing season.

Micronutrients: Follow NCDA&CS soil analysis recommendation.

Post-plant

Prune plants within two weeks or less after setting, pruning determinate varieties differently than indeterminate varieties.

Determinate tomatoes = depending on vigor of plant, reduce to 2–3 suckers above first cluster of flower/fruit (more vigorous 2 suckers, less vigorous 3 suckers). This is the <u>ONLY</u> pruning done for this type of tomato.

Indeterminate tomatoes = Remove all suckers, and continue to remove suckers throughout the season.

Stake plants before pruning; continue to stake as plants grow.

First apply fertilizer through drip irrigation when the lowest fruit cluster is dime size. Use the fertilizing schedule outlined below as a guide:

	First Fruit Cluster: Dime size to dollar coin size		**First Fruit Cluster: Dollar coin size to peak harvest**		**Peak Harvest to End Harvest**	
Nutrient	**Rate (lb/acre/wk)**	**Tissue Report Value**†	**Rate (lb/acre/wk)**	**Tissue Report Value**†	**Rate (lb/acre/wk)**	**Tissue Report Value**†
N (nitrogen)	3–4	NA	6–7	NA	3–4	NA
K_2O (potash)	10–12	4.0%	20–25	2.5–3.0%	10–12	2.5–3.0%
B (boron)	NA	NA	0.25‡	40–75 ppm	0.25	40–75 ppm

† The NCDA&CS Plant Analysis Report provides actual numbers, not index values. Although the tissue report measures %K (potassium), the fertilizer rate given here is for potash (K_2O).
‡ Recommendation is actual B. If, for example, Solubor® is used, application rate would be 0.5 lb/acre.

This fertilizer application schedule is more applicable to determinate tomato varieties. With drip irrigation, recommended rates can be easily achieved through use of potassium nitrate (13-0-44). An application of approximately 25 lb/acre of potassium nitrate during the period of dime-sized fruit on the first cluster to dollar-sized fruit will fulfill the suggested requirements of N and K in the previous chart. Doubling the amount of potassium nitrate to 50 lb/acre meets the recommendations for N and K during the period from dollar-sized fruit to peak harvest. Then, dropping back down to 25 lb/acre from peak harvest to end of harvest will finish out the tomato plants.

Indeterminate tomato varieties will need additional nitrogen, as they continue to grow vegetatively as well as produce fruit. Determinate tomato varieties will stop active vegetative growth and increase production of fruit. This difference in growth habits is best accommodated with more N to the indeterminate varieties and less to the determinate varieties. An additional 5 to 7 lb/acre should be added to the above fertilizer schedule for indeterminate varieties.

Use tissue analysis results to determine whether to add B or more K. Apply more of these nutrients when a report shows actual values lower than those listed in the previous table for K and B. Apply any other nutrients recommended on the report as well.

When the first fruit cluster is about the size of a dime, begin tissue sampling to check K and B levels plus other nutrients. Take the most recently matured leaf, counting down about three to four leaves from growing point. Taking tissue samples every two weeks, or as needed, will help maintain good fruit set and quality.

Blossom-end Rot (BER) is a common problem with tomato production. The physiological disorder is caused by a lack of Ca in the cell walls of the fruit. Calcium is an immobile element in most plants, meaning that unless the roots are constantly supplying this element to the new forming tissue, there will be a shortage. Calcium moves from the soil up the plant to new forming tissue with water movement, so a lack of water is the main cause of a lack of Ca, not necessarily a lack of Ca in the soil. Soil tests often show that there is sufficient Ca in the soil, but without water to move the Ca from the soil to the growing tissue, a Ca deficiency could occur. This is true in field production of tomatoes. When BER appears on the fruit, it is the result of a lack of water to the plant approximately three weeks previously.

The addition of 300 to 500 lb/acre of gypsum will give the plants a good base to draw from for their Ca need, but without sufficient water, BER will still occur. Check the soil for adequate moisture at least weekly if not twice a week. Check by seeing if a soil will maintain its shape after it is squeezed and no excess water comes off. If the soil crumbles in your hand, more water is needed.

Conclusion

Growing field tomatoes under plastic and drip irrigation is, in some ways, related to growing tomatoes in the greenhouse. In greenhouse production of tomatoes, the plants are grown in pots or bags with limited root growth and the nutrients are applied by slow drip. The potting media acts more as support for the roots and a temporary holding facility of needed nutrients. The roots feed from the drip irrigation in a small confined space for the life of the plant and still produce. This process is much like spoon feeding the plant for the duration of its life cycle.

With field-grown tomatoes under plastic and with drip irrigation, the needed nutrients are supplied in a similar fashion. **Table 1** illustrates this point. Soil samples taken from three farms show that soil pH is higher nearest to the emitter. This is a function of the higher soluble salt levels away from the drip emitters and the constant presence of water near the drip emitters. High concentrations of salts will lower the soil pH. The sources of these salts are fertilizers

(N & K). These same fertilizer salts are absent around the emitter. Their absence is due to the fact the tomato roots have concentrated around the emitter for water and nutrients and have used all the fertilizer salts in that region, allowing the soil pH to be maintained at or above the starting soil pH.

It should also be noted that the P and K levels are about the same both near and away from the emitters, indicating that only the initial starting fertilizer amounts are still present, even though more K and possibly P where added to the soil via drip irrigation. There is a dramatic increase in the amount of sulfur in the soil away from the emitter, showing either increase S uptake where water was present or S leaching away from the emitter with water movement or both.

These soil parameter measurements indicate that the area around drip irrigation/emitters is the main growing environment and source of nutrients for tomatoes. Therefore, fertilizer rates and timing are crucial for a productive crop.

Table 1. Comparison of soil test values for samples taken at two distances from the drip emitters in a field tomato production system with black plastic (three field locations).

Village Creek Farms (Larry Ipock)

Soil Parameter	Near emitter	Far from emitter
Soil Classification	mineral	mineral
pH	7.6	5.6
P Index	189	181
K Index	23	10
S Index	31	146
Soluble Salts	4	15

Quinn Farms (Bo Quinn)

Soil Parameter	Near emitter	Far from emitter
Soil Classification	mineral	mineral
pH	7.2	5.5
P Index	334	364
K Index	28	32
S Index	31	39
Soluble Salts	5	11

Garner Farms (Clayton Garner, Jr.)

Soil Parameter	Near emitter	Far from emitter
Soil Classification	mineral-organic	mineral-organic
pH	6.5	5.3
P Index	225	233
K Index	54	55
S Index	84	170
Soluble Salts	8	20