



## Nitrogen Fertilization SOIL and LEAF SAMPLING

### Soil Sampling

Soil samples for nitrate analysis should be taken before the first N application of the season, either before transplanting or before the first in-season N application.

Samples are generally taken to a depth of 1 to 2 feet. Due to the variability of nitrate in the soil, care must be taken that the sample is representative for the field.

The residual nitrate present in the rooting zone can be subtracted from the crop N requirements to determine the amount of fertilizer N that needs to be applied.

### Leaf Analysis

Whole leaf analysis provides a more reliable estimate of crop nutrient status than petiole analysis. The fourth leaf from the growing tip is generally sampled. Leaf nutrient concentrations within the ranges reported in the table can be considered sufficient for high-yielding processing tomatoes. The farther outside these ranges the measured concentrations are, the more likely it is that N is deficient or available in excess.

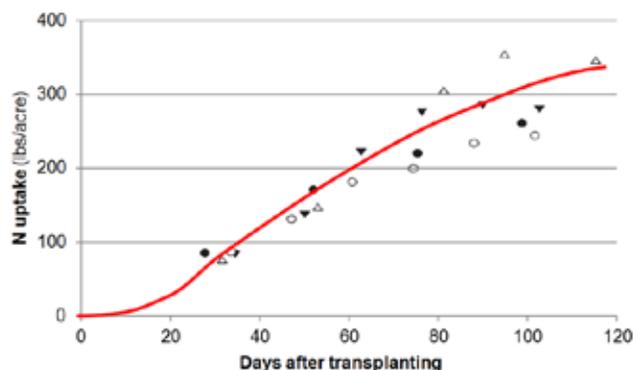
**Optimum Whole Leaf Nutrient Concentrations** (To convert the concentrations to %, divide the numbers by 10).

Growth Stage	Nutrient Concentrations (g/kg)		
	N	P	K
First Bloom	46-52	3.2-4.9	22-35
Full Bloom	35-45	2.5-4.1	16-31
10% of fruits showing red color	27-38	2.3-3.7	8-20



## Tomato Nitrogen Uptake and Partitioning

### Seasonal N Uptake



Information regarding tomato fertility management, including placement, fertilizer source, phosphorus and potassium, is available at:

[www.cdfa.ca.gov/go/FREPGuide](http://www.cdfa.ca.gov/go/FREPGuide)



### SELECTED REFERENCES

Hartz, T.K, Bottoms, T.G., 2009. Nitrogen requirements of drip-irrigated processing tomatoes. *HortScience* 44, 1988-1993.

May, D., Mitchell, J., 2001. Soil testing to optimize nitrogen management for processing tomatoes. FREP Final Report. Available online at <http://www.cdfa.ca.gov/is/ffldrs/frep/pdfs/completedprojects/97-0365M97-03May.pdf>



# TOMATO NITROGEN Fertilization Guidelines

Online nutrient guidelines for tomato and other crops, as well as relevant references, are available at:

[www.cdfa.ca.gov/go/FREPGuide](http://www.cdfa.ca.gov/go/FREPGuide)

The information in this pamphlet is based on research funded by the Fertilizer Research and Education Program, California Dept. of Food and Agriculture, and from other sources.

Daniel Geisseler and William R. Horwath, Department of Land, Air and Water Resources, UC Davis, gathered and organized the guideline information through FREP grant agreement 11-0485.



**UC DAVIS**



## Nitrogen Fertilization at PREPLANT or TRANSPLANTING

Tomato plants take up less than 30% of their N before fruit set. Therefore, most pre-plant N needs to remain in the root zone for a relatively long time before the plants take it up. This increases the risk of N leaching below the root zone, especially in furrow irrigated systems. Taking into account residual soil nitrate, the need for pre-plant N is often minimal and a small starter N application is likely more efficient.

### Application Rates

Starter N application rates in commercial fields generally range from 5 to 15 lbs/acre.

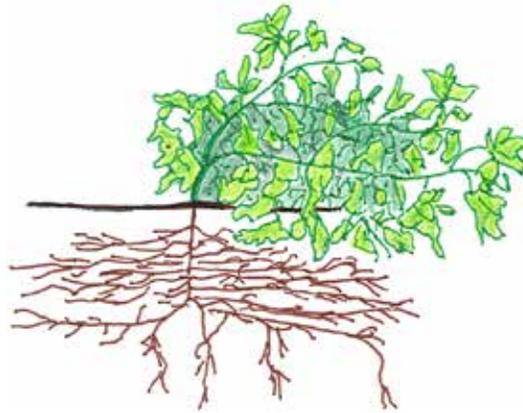
If a pre-plant application is preferred, applying moderate levels of N before or at planting (max. 30 lbs/acre) and applying the rest during the growing season minimizes the risk of N losses.

### Mode of Application

For easy access by growing roots, starter fertilizer is best placed in a band 1 to 2 inches below the seed. Fertilizer located 2 inches to the side of the seed line is less efficient. For transplants, the placement of the starter fertilizer is deeper and can be slightly offset to the side so that it can be reached by roots growing out of the root ball.

### Fertilizer Type

Starter blends containing N and P, such as a 10-34-0 solution, can assist in P uptake leading to better root development.



## Nitrogen Fertilization during VEGETATIVE GROWTH to FIRST RED FRUITS

### Application Rates

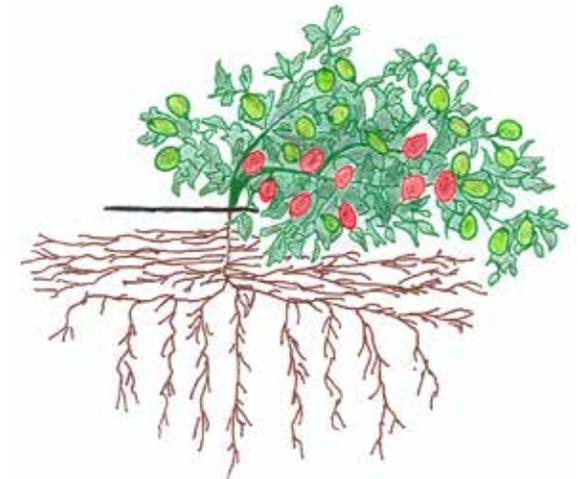
For drip-irrigated processing tomatoes, a seasonal rate of approximately 175 lbs N/acre is adequate to maximize fruit yields in most soils.

The application rate should be reduced in fields with high residual soil nitrate concentrations or when irrigation water with a high nitrate concentration is used. Leaf N analyses can be used to monitor the field during the season and detect insufficient or excess N availability.

### Application Timing

Most of the tomato plant's seasonal growth and N uptake occurs between early fruit set and the early red fruit stage. For maximum effectiveness, sidedress N and N fertigation should be timed to maintain an adequate N supply during this period of high N demand.

The amount of N taken up after the early red fruit stage is minimal, as the N demand of the fruits is met with N translocated from the leaves and stems. Therefore, N applied after the first fruits turn red likely remains in the soil and may be leached or denitrified during the winter.



## Nitrogen Fertilization during VEGETATIVE GROWTH to FIRST RED FRUITS (continued)

### Mode of Application

Fertigation is the preferred mode of application in drip-irrigated systems. Fertigation allows synchronizing N additions with plant demand.

Sidedress N to furrow or sprinkler irrigated tomatoes is most often applied in a band.

### Foliar N

For drip-irrigated tomatoes, there is generally no need for foliar applications, as N can be fertigated throughout the season to meet N demands.

If a foliar N application is considered necessary, a relatively dilute solution needs to be applied, as tomato foliage has a relatively low tolerance to urea. To prevent leaf damage, a urea-N concentration of 4-6 lbs/100 gallons has been recommended.



For more references and information about N management  
in tomato, please access:

[www.cdfa.ca.gov/go/FREPGuide](http://www.cdfa.ca.gov/go/FREPGuide)