Nitrogen Fertilization
SITE-SPECIFIC

Taking Non-Fertilizer N into Account
Non-fertilizer N sources need to be taken into account when planning N application rates. Nitrate in the irrigation water and nitrogen mineralization from soil organic matter and crop residues also add available soil N. Net N mineralization is generally higher after broccoli or cauliflower than after lettuce. Considering non-fertilizer N well help reduce the amount of N fertilizer applied.

These factors are taken into account by CropManage, a web-based irrigation and N management software tool developed by Cahn and coworkers. CropManage can be accessed here:
https://ucanr.edu/cropmanage/login/

Soil Sampling
Soil samples for nitrate analysis can be sent to a laboratory or extracted and analyzed on the farm. The soil nitrate quick test with colorimetric test strips is highly correlated with the standard laboratory technique and has been found to be a reliable estimate of current soil N status. When the quick test is used correctly, soil nitrate and N mineralization can be determined in a timely manner in order to make N fertilization decisions.

SELECTED REFERENCES

Online nutrient guidelines for lettuce and other crops, as well as relevant references, are available at:
www.cdfa.ca.gov/go/FREPguide
Nitrogen Fertilization
at **PREPLANT** or **SEEDING**

**Application Rates**

Pre-plant and starter application rates depend on residual soil nitrate-N. When the residual nitrate-N concentration exceeds 20 ppm, no N application is required. When the residual soil nitrate-N concentration is lower, a small application of 20-40 lbs N/acre just before or at planting is sufficient to cover the early N needs. To ensure that N is available in the root zone of young plants, the irrigation management needs to be optimized to prevent nitrate movement below the root zone.

**Application Timing**

Pre-plant N applied in fall at bed listing is highly susceptible to leaching below the root zone by winter rain. Starter fertilizer is generally applied as a band, placed two inches below and two inches to the side of the seed row. Lettuce receiving banded fertilizer starter N generally outperforms lettuce that received a broadcast N application before seedbed preparation.

---

Nitrogen Fertilization during **ROSETTE STAGE** and **HEAD DEVELOPMENT**

**Application Timing**

When the pre-sidedress soil nitrate-N concentration is below 20 ppm, the first sidedress N application is done after thinning at the two- to four-leaf-stage. If the residual nitrate-N concentration drops below 20 ppm, a second application is done 2-4 weeks later at the cupping stage. Some growers apply 10-15 lbs N/acre 7 to 10 days prior to harvest to assure that the crop color and growth rate are optimal. The decision whether to apply late-season N should also depend on the residual nitrate-N level.

**Leaf Analysis**

A minimum of the 20 youngest wrapper leaves should be collected, each from a different healthy plant of representative vigor. Samples are taken from the entire field. Variable fields should be divided into uniform blocks, which are sampled separately. It is important to accurately determine the crop growth stage, since the total N concentration declines as crops develop. The optimum nutrient concentrations can be considered sufficient for high-yield production. As the values were obtained from fields with generally high N and P inputs, values below the optimum range for these two nutrients may not limit yield.

**Optimum N, P & K Concentrations of Whole Leaf Samples**

<table>
<thead>
<tr>
<th>Sampling Date</th>
<th>N</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Heading</td>
<td>4.3-5.6</td>
<td>0.45-0.75</td>
<td>3.3-6.4</td>
</tr>
<tr>
<td>Pre-harvest</td>
<td>3.3-4.8</td>
<td>0.35-0.75</td>
<td>2.9-7.8</td>
</tr>
</tbody>
</table>

For more references and information about N management in lettuce, please access: [www.cdfa.ca.gov/go/FREPguide](http://www.cdfa.ca.gov/go/FREPguide)