Nitrogen Requirements

LATE SEASON

Foliar Application

Foliar applications are generally made between peak and late bloom. Foliar fertilizers are best used to supplement soil-applied N in order to correct for N deficiencies during boll development.

While N deficient plants respond to foliar N, yield of plants with an adequate N supply is generally not increased. Therefore, foliar N is applied when petiole levels or crop development indicates that the need for N exceeds the plant’s capacity to take up N from the soil and when it is too late in the season to side-dress N.

Nitrogen Partitioning

In concentrations measured immediately before defoliation, more than half of the aboveground N of Accala cotton was in the seeds. Nitrogen in the fiber and burs accounted for about 15%.

More information on cotton fertility management, including placement, fertilizer source, phosphorus and potassium are available at:

www.cdfa.ca.gov/go/FREPguide

SELECTED REFERENCES


Photos provided by Dan Munk, UC Cooperative Extension
Nitrogen Fertilization

**PREPLANT**

Only a small portion, less than 15-25% of the total N, is taken up by the cotton plant during the first two months after planting. Thus, high preplant N applications typically have no beneficial effect on yield.

Preplant N remains in the root zone for a long time before being taken up by the plants, increasing the risk of N leaching below the root zone. Applying moderate levels of N before or at planting and applying the rest as a sidedress application minimizes the risk of N losses.

**Soil Sampling**

Soil samples for nitrate analysis should be taken near planting time or at least three weeks after the last N application. As cotton is a deep rooting crop, samples should be taken to a depth of at least two feet. Due to the variability of nitrate in the soil, care must be taken that the sample is representative for the field.

In a FREP-supported study, carried out in the San Joaquin Valley between 1996 and 2000, Hutmacher and collaborators found that the residual nitrate–N level in spring can be fully subtracted from the crop N requirements to determine the amount of fertilizer N that should be applied.

For more information and references about N management in cotton, access the California Fertilization Guidelines at: cdfa.ca.gov/go/FREPguide

Nitrogen Fertilization

**at SOWING**

Starter fertilizers are an effective way of providing sufficient N and P to young plants when residual soil N levels are low. Starter fertilizers can strengthen the root system and encourage early rapid growth necessary to compete with weeds. Under conditions where starter fertilizer has a positive effect, a yield increase of up to 10% may be achieved.

**Application Rates**

Application rates range from 5 to 35 lbs N/acre. Higher N rates can have negative effects on seedling development but they may be appropriate for soils with residual nitrate levels below 50 lbs N/acre.

When starter fertilizer is applied at a distance of more than two inches from the seed, the amount of N+ K2O that can be applied safely is 20 and 40 lbs/acre in sandy and fine-textured soil, respectively.

**Application Mode**

For surface and sprinkler irrigated cotton systems, side banded applications are more efficient than broadcast applications. The most common placement for starter fertilizer is two inches to the side and two inches below the seed drill. Starter fertilizer should not be placed in direct contact with the seed due to salt effects.

Fertigation through drip irrigated systems has also been shown to be a highly efficient way to deliver water and N to the crop.

**SIDEDRESS**

**Application Rates**

The N requirement of cotton strongly depends on the yield target, due to the high N content of the cotton boll. The type of cotton grown is also a factor in determining N requirements. N application rates to Pima cotton are lower compared to Acala cotton due to slightly lower yields and the sensitivity of Pima cotton to excess N.

The table shows nitrogen application rates for Acala cotton based on expected yield. The rates in the table need to be corrected for residual soil N.

<table>
<thead>
<tr>
<th>Yield goal (bales/acre)</th>
<th>N Fertilization (lbs lint/acre)</th>
<th>N Fertilization (lbs N/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>750</td>
<td>55</td>
</tr>
<tr>
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<td>1000</td>
<td>115</td>
</tr>
<tr>
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<td>3</td>
<td>1500</td>
<td>200</td>
</tr>
<tr>
<td>3.5</td>
<td>1750</td>
<td>200</td>
</tr>
</tbody>
</table>

**Application Timing**

Soil N applications should be completed by midbloom, as excessive and late N application can delay maturity, resulting in more difficult defoliation and a later harvest. Splitting larger N applications has the advantage that the total N requirements of the plants can be estimated more accurately based on boll load.