Predicting N sufficiency in organic processing tomato production
2012-13 study:
37 organic processing tomato fields monitored
- Soil nitrate-nitrogen (NO$_3$-N) sampled about 3 weeks after transplanting (WAT)
- Whole plant N concentration at 11 WAT measured in 22 fields to measure overall N sufficiency
- Laboratory incubation to estimate soil N mineralization capacity
We know how much crop N uptake is required for high-yield tomato production ... 

- Critical N concentration = the whole plant N concentration below which crop growth is reduced
We know how much crop N uptake is required for high-yield tomato production ...

- Critical N uptake

- High-yield organic tomato (40-50 tons/acre) must take up > 220 lb N/acre
How are N inputs managed?

<table>
<thead>
<tr>
<th>N management practice</th>
<th>Number of fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overwinter cover crop</td>
<td>1</td>
</tr>
<tr>
<td>Fall manure or compost application</td>
<td>29</td>
</tr>
<tr>
<td>Spring pre-transplant fertilizer application</td>
<td>14</td>
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<tr>
<td>Post-transplant fertilizer application</td>
<td>9</td>
</tr>
</tbody>
</table>
Fields differed widely on soil NO$_3$-N at 3 WAT:

How much N does this represent?

50 lb/acre

240 lb/acre
In-season soil N mineralization unlikely to keep up with crop N uptake:

- Estimated soil N mineralization in 70 days (lb N/acre)
How common was late-season N deficiency?

- About 30% of fields developed N deficiency by 11 WAT
Relationship between soil NO₃-N at 3 WAT and late-season N sufficiency:

Conclusions:
- Nitrogen dynamics in organic production are not radically different from conventional production
- Organic fields must begin the crop season with substantial residual soil NO₃-N because crop N uptake will outrun the soil’s N mineralization potential
- Fields with low initial soil NO₃-N are candidates for in-season N fertilization