Fertilizer Options for Organic Production

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Outline

- Fun facts about organic fertilization
- Organic certification
- Big Picture Amendments
- Nutrients
- Biologicals
Fun Facts

- Before 1850 virtually all Nitrogen consumed in the U.S. was from natural organic materials.

- Plants cannot tell if nutrient is from organic or synthetic source.

- The plant can tell the difference in form on the nutrient.
Organic Certification

- USDA’s National Organic Program

- MROs
  - OMRI
  - WSDA
  - CDFA
17 Organic Certifiers

- Colorado Department of Ag
- A Bee Organic
- Organic Certifiers, Inc.
- CCOF Certification Services
- SCS Global Services
- OneCert, Inc.
- Organic Crop Improvement Association
Organic Certified Products

- Make sure the product you want to use is approved by your certifying agency.
Crop Needs

- Potatoes
- Grains
- Alfalfa
# Potato Nutrient Needs

Table 1. Potato nutrient uptake and removal totals based on a 400-500 cwt./acre yield.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Total Plant Uptake, lbs/acre</th>
<th>Amount in Tuber (Removal), lbs/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>200-240</td>
<td></td>
</tr>
<tr>
<td>Phosphorus</td>
<td>25-35 (57-80 as P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;)&lt;sup&gt;*&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>280-320 (336-384 as K&lt;sub&gt;2&lt;/sub&gt;O)&lt;sup&gt;*&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Sulfur</td>
<td>18-24</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Manganese</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Boron</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>Chloride</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Molybdenum</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>0.005</td>
<td></td>
</tr>
</tbody>
</table>

*Quantities of phosphorus and potassium are expressed in fertilizer materials as P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O, respectively. Neither of these compounds exist, but these are the forms that were thought to be taken up by plants in the days when fertilizer labeling was initiated in the 1940’s. Although later proven to be non-existent, these expressions for phosphorus and potassium have remained entrenched as the convention for fertilizer labeling. (P x 2.29 = P<sub>2</sub>O<sub>5</sub> and K x 1.2 = K<sub>2</sub>O)
Barley Nutrient Needs

- 150 bu/a and 2.5 tons straw/a will remove

  - 150 lbs/a Nitrogen
  - 60 lbs/a P$_2$O$_5$
  - 175 lbs/a K$_2$O
  - 25 lbs/a Magnesium
  - 21 lbs/a Sulfur
  - 0.22 lbs/a Zinc
Alfalfa Nutrient Needs

- 6 Ton of hay will remove:
  - 335* lbs/a Nitrogen
  - 62 lbs/a $\text{P}_2\text{O}_5$
  - 350 lbs/a $\text{K}_2\text{O}$
  - 175 lbs/a Calcium
  - 30 lbs/a Magnesium
  - 30 lbs/a Sulfur

*Alfalfa produces about 90% of the N required
Soil Sampling
Soil Sample

<table>
<thead>
<tr>
<th>Nitrate-Nitrogen</th>
<th>Phosphorus</th>
<th>Potassium</th>
<th>Sulfur</th>
<th>Calcium</th>
<th>Magnesium</th>
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</thead>
<tbody>
<tr>
<td>ppm</td>
<td>ppm P</td>
<td>ppm K</td>
<td>ppm</td>
<td>ppm Ca</td>
<td>ppm Mg</td>
</tr>
<tr>
<td>62</td>
<td>223</td>
<td>44</td>
<td>204</td>
<td>139</td>
<td>500</td>
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<td>4</td>
<td>14</td>
<td>17</td>
<td>361</td>
<td>16</td>
<td>58</td>
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</tbody>
</table>
Justus von Liebig’s

Law of the Minimum

Most Commonly Deficient Nutrients Seen in Organic Production

- Nitrogen
- Calcium
- Phosphorous
- Potassium
Field With Full Fertility
Low Fertility Organic Field
Healthy Organic Field
The Big Picture

- Field
  - Short term vs long term

- Crop/Variety
  - Norkotah 3 vs Norkotah 296

- Rotations
  - Green manure, grain, alfalfa
Green Manure Crops

- Monocultures
- Multi-species blends
- Legumes
Natural Amendments

- Manure