Potatoes managed for maximum productivity have a high demand on soil nutrients. Significant quantities of nutrients are accumulated in the tops and are removed from the field in the harvested tubers (Table 1). Since potatoes are commonly grown on sandy-textured soils, additional challenges for nutrient management are present.

Potatoes grown for processing are valued for yield, size, and also for dry matter content (measured by specific gravity). As the specific gravity increases, the water content of the potato decreases, improving the frying properties and flavor. Management factors, including fertility decisions, will influence potato yield, quality, and storage properties. Potato growth is classified into four distinct growth phases (Figure 1). The exact timing of these growth phases depends on many environmental and management factors that vary between locations and cultivars. However, these distinct stages of growth need to be considered when managing the crop.

The maturity class and growing season length are two primary factors determining potato nutrient requirements. Short-season, early maturing (determinate) potatoes generally have a high and intense nutrient demand during the vegetative and tuber initiation stages. Long-season potatoes (indeterminate) have a longer period of nutrient uptake. The specific fertilization strategy must be adjusted for the different varieties and maturity classes or poor results will occur.

Nutrient Management

For potatoes, either deficient or excessive plant nutrition can reduce tuber bulking and quality. Nutrient deficiencies may limit the leaf canopy growth and its duration, resulting in reduced carbohydrate production and tuber growth (Table 1).

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Total Nitrogen</th>
<th>Total Phosphorus</th>
<th>Total Potassium</th>
<th>Total Calcium</th>
<th>Total Magnesium</th>
<th>Total Sulfur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>139</td>
<td>214</td>
<td>353</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>1</td>
<td>11</td>
<td>29</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>2</td>
<td>275</td>
<td>240</td>
<td>515</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>43</td>
<td>7</td>
<td>51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>25</td>
<td>15</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur (S)</td>
<td>12</td>
<td>22</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Oregon State Univ. Potato Information Exchange. 2004. Also personal communication, Dr. Don Horneck, Oregon State Univ.

1To convert P to P_2O_5, multiply by 2.29
2To convert K to K_2O, multiply by 1.2

Best Management Practices for Profitable Fertilization of Potatoes

By Rob Mikkelsen

Because of the intensive nature of potato production, considerable work has been done to determine the optimum techniques to manage the crop and nutrients. This article looks at fertilizer best management practices (BMPs) for potatoes.
Potatoes are a shallow-rooted crop, generally growing on sandy, well-drained soils. The period of highest root density and time to maturity is important to support vegetative growth, and applying some nutrients during the growing season involves applying some nutrients. This allows producers to determine the N status with appropriate nutrients.

Nutrient applications may cause nutrient imbalances or over-stimulate vegetative growth. Maintaining healthy leaves is a key to potato development and function. Proper irrigation is important to support vegetative growth, but excessive soil N later in the season will decrease the specific gravity in some cultivars. Excess soil N late in the season can decrease tuber disease resistance and increase susceptibility to diseases and its ability to tolerate stresses such as drought and frost. Apply potassium early in the season to improve rooting and Chlора and grow resistance to diseases and improve plant nutrient status.

Potato petioles are frequently sampled with side-dress applications or through root density and time to maturity. Use of petiole analysis during the growing season allows producers to determine the N status during the growing season.

Potatoes require large amounts of water during the growing season. This involves applying some nutrients. However, excessive soil N later in the season will decrease the specific gravity in some cultivars. The irrigation system is recommended that potatoes receive split applications of N during the growing season. This involves applying some nutrients.

Commonly available P fertilizer sources are equally useful for potato nutrition. The beneficial in improving P uptake and potato storage properties. These soil conditions frequently make water storage properties.

Proper N management is one of the most important factors required to obtain high yields. An adequate early season N supply is important to support vegetative growth, but excessive soil N later in the season will decrease the specific gravity in some cultivars. Excess soil N late in the season can decrease tuber disease resistance and increase susceptibility to diseases and its ability to tolerate stresses such as drought and frost. Apply potassium early in the season to improve rooting and Chlора and grow resistance to diseases and improve plant nutrient status.

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