Potato Production

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Production Requirements

The potato is a cool season crop and in Oklahoma it is grown through the spring months and harvested in early summer. Fall potato production usually results in poor plant stands and low production, due to high soil temperatures at planting and during early crop development. Potatoes grow best in fertile, well-drained, sandy loam soils. Planting on poorly drained soils usually results in a poor plant stand, due to seed piece decay and poor quality potatoes at harvest. Soils which blow or have poor water holding capacity should be avoided. A good potato yield in Oklahoma is 200 to 250 cwt/acre. High temperatures or insufficient moisture in the late spring and early summer, while the potato tubers are forming reduces yield. Under good management and weather conditions, yields of 300 cwt/acre are possible.

Varieties

Select the potato variety best suited to your conditions and market. Buyers contracting potato production for chipping will designate the variety to be grown.

Red Skinned
- Red LaSoda - Round to oblong, medium early, eyes medium deep, high yield, fresh market.
- Viking - Round, medium maturity, relatively shallow eyes, fresh market.

White Skinned
- Kennebec - Oblong, late, eyes shallow, high specific gravity, good chipper, general purpose use.
- Superior - Round, early, eyes moderately deep, fresh market, and early chip processing.

Russet Skinned
- Norgold Russet - Oblong to long, early, shallow eyes, early fresh market russet.

Soil pH and Fertilizer

Potatoes grow well on a wide variety of soils and soil pH can be as low as 5.0 with satisfactory production. Potatoes are less susceptible to scab when soil pH is between 5.0 and 5.5. If pH is too low apply dolomitic limestone. Based on OSU soil test results the following quantities of $P_2O_5$ and $K_2O$ are recommended.

<table>
<thead>
<tr>
<th>Phosphorus per acre</th>
<th>When test shows</th>
<th>0-19</th>
<th>20-39</th>
<th>40-69</th>
<th>70-99</th>
<th>100 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add lbs/A $P_2O_5$</td>
<td></td>
<td>150</td>
<td>100</td>
<td>75</td>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potassium per acre</th>
<th>When test shows</th>
<th>0-99</th>
<th>100-199</th>
<th>200-249</th>
<th>250-299</th>
<th>300 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add lbs/A $K_2O$</td>
<td></td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

Nitrogen

Apply 75 lbs/AN along with recommended $P_2O_5$ and $K_2O$ by either broadcast preplant incorporated or one half broadcast and one half with the planter in bands placed 3 to 4 inches to each side and 1 to 2 inches below the seed piece. Top dress or irrigate on additional N when tubers begin to form. Two or three N top dress applications of 30 to 40 lbs/acre each may be needed. Too much N can be detrimental and decrease tuber quality, grade, and yield. Soils having a high amount of nitrate-N from previous fertilization, green mature crops, or from livestock manure will require less N fertilizer. Potassium sulfate is preferred to potassium chloride as the potassium source, since skin color and specific gravity may be adversely affected by potassium chloride.

Soil Preparation

Good water penetration and aeration are musts for proper growth and tuber formation. Excessive tillage and land preparation causes compaction and should be avoided. To be effective the soil should be plowed below any compacted layer within the normal root zone and then disk harrowed before planting. Spike-tooth harrowing to break clods and level the soil may be needed just prior to planting.

Seed and Planting

Use only certified seed tubers. Potato production costs are too great to risk using noncertified seed. Certified seed of good quality grown in the northern states normally produces the largest yields, the highest quality tubers, and the fewest disease problems. Pieces of large seed tubers are used for
Disease Resistance of Recommended Potato Varieties*

<table>
<thead>
<tr>
<th>Skin Color/ Variety</th>
<th>Fusarium Seed Piece Decay</th>
<th>Early Blight</th>
<th>Verticillium wilt</th>
<th>Common Scab</th>
<th>Blackleg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Skinned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red LaSoda</td>
<td>MR&lt;sup&gt;b&lt;/sup&gt;</td>
<td>MR (foliage)</td>
<td>MS</td>
<td>MS</td>
<td></td>
</tr>
<tr>
<td>Viking</td>
<td>_</td>
<td>S (foliage)</td>
<td>_</td>
<td>MR</td>
<td>_</td>
</tr>
<tr>
<td>White Skinned</td>
<td>_&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kennebec</td>
<td>_&lt;sup&gt;d&lt;/sup&gt;</td>
<td>MS (foliage)</td>
<td>S</td>
<td>S</td>
<td>MS</td>
</tr>
<tr>
<td>Superior</td>
<td>*</td>
<td></td>
<td></td>
<td>R</td>
<td>_</td>
</tr>
<tr>
<td>Russet Skinned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norgold</td>
<td>S</td>
<td>S (foliage)</td>
<td>S</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Russet</td>
<td>R (tuber)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* This variety disease resistance information was gathered from several sources across the United States and is meant to serve only as a general guideline; the resistance or susceptibility of a particular variety to a given pathogen may vary under Oklahoma conditions.

<sup>b</sup> S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant.

<sup>c</sup> _ indicates no information available.

<sup>d</sup> indicates resistance to one or more strains of the fungus.

Planting. Small whole tubers can be used with equal results. Seed pieces should be 1/2 to 2 ounces in size. Using smaller seed pieces usually results in lower yields. Cut seed pieces can be suberized (healed over) before planting, but planting fresh cut seed is a normal practice since growers usually lack the time and space to store large quantities of cut seed before planting. Treatment of seed pieces with fungicides may not always be necessary as OSU researchers have shown that such applications are likely to increase yield only when the cut seed pieces must be stored three or more days prior to planting. Seed required to plant an acre depends upon seed piece size and seed spacing. Distance between rows is commonly 36 inches.

<table>
<thead>
<tr>
<th>Spacing of seed pieces within 36’ rows</th>
<th>Seed needed per acre when seed pieces weigh an average of 1 oz</th>
<th>1/2 oz</th>
<th>3/4 oz</th>
<th>2 oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 inches</td>
<td>20.4</td>
<td>23.8</td>
<td>27.2</td>
<td></td>
</tr>
<tr>
<td>10 inches</td>
<td>16.3</td>
<td>19.0</td>
<td>21.8</td>
<td></td>
</tr>
<tr>
<td>12 inches</td>
<td>13.5</td>
<td>15.8</td>
<td>18.1</td>
<td></td>
</tr>
</tbody>
</table>

Planting should begin in early March in central Oklahoma to promote early crop development and avoid extreme summer temperatures. There are several types of planters available that place the seed pieces in the soil and apply fertilizer and systemic insecticides in one operation. Seed depth should be about 4 inches below the top of the planted bed. Soil is ridged over the row by throwing soil to the plants during early cultivation, so that about 6 inches of soil cover the seed piece when tuber formation occurs. Depth for hilling differs between varieties.

Cultivation

Potatoes develop larger and more extensive root systems in response to proper cultivation. Loose, friable soil improves tuber set and development of smooth, well-shaped and even-colored potatoes. Cultivation may be necessary to control weeds, keep soil hilled-up, and aid water penetration and soil aeration. Cultivate only when needed. Deep cultivation should be avoided since many roots are destroyed. Extra cultivations are expensive, increase soil compaction, and reduce yield. By the time plants reach full bloom cultivation should cease.

Weed Control

Weeds should be controlled in potato fields, since they cause many problems besides being hosts for insects and diseases. An effective weed control program takes into account the weed problem, cultivation, and herbicides. Fields containing perennial weeds should be avoided. When herbicides are used, the choice of which one or ones to use should be tailored to the specific weed problems and when these weeds germinate. Methods of application vary from preplant incorporation, post-plant and preemergence, to post-emergence applications. Various herbicides can be applied by ground rig, airplane, or through the sprinkler irrigation system. For herbicide recommendations consult the most recent revision of OSU Extension Fact Sheet F-6008, the latest edition of the Extension Agents’ Handbook, or Commercial Vegetable Insect, Disease, and Weed Control (E-827).

Irrigation

Soil moisture is probably the most important factor determining potato yield and quality. About 20 inches of water are needed to produce a potato crop in central Oklahoma. When irrigation is practiced to supplement rainfall it should be applied in frequent light amounts. Secondary growth and growth cracks occur when irrigation or rainfall occurs after moisture stress. The soil should be kept uniformly moist until tubers have reached full size. For irrigation management decisions: 1) the effective rooting depth of potatoes is two feet, 2) the soil should not be allowed to dry below 65% of field capacity, and 3) moisture levels above field capacity will seriously
Potatoes develop larger and more extensive root systems when tuber formation occurs. Depth for hilling differs between about 4 inches below the top of the planted bed. Soil is that place the seed pieces in the soil and apply fertilizer and to promote early crop development and avoid extreme summer cut seed pieces must be stored three or more days prior to such applications are likely to increase yield only when the time and space to store large quantities of cut seed before can be suberized (healed over) before planting, but planting seed pieces usually results in lower yields. Cut seed pieces planting. Small whole tubers can be used with equal results.

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**Diseases**

A very common fungal disease of the foliage is early blight (*Alternaria*). Fusarium and Verticillium wilts are also caused by fungi. Blackleg, a bacterial disease, is characterized by a blackening of stems and a yellowing and curling of leaves. Tubers of the potato are also subject to attack by a variety of pathogens. Various *Fusarium* species and the blackleg bacterium cause tuber rots. *Rhizoctonia solani* forms black sclerotia on the surface of tubers, which gave rise to the name black scurf for this particular disease. Another fungal disease of the tuber surface is common scab (*Streptomyces*).

Root-knot nematodes form irregular bumps on the tubers. The potato plant is also susceptible to a variety of virus diseases such as potato leaf roll, rugose mosaic, and purple top. A three to four year rotation helps avoid certain disease problems. Non-parasitic diseases in Oklahoma potatoes are represented by sunscald, sunburn, and tipburn.

Descriptions and control measures for the above diseases are available in OSU Extension Fact Sheet F-7635 Irish Potato Diseases: Prevention and Control. For specific disease control measures see the latest edition of the Extension Agents’ Handbook (E-832) or Commercial Vegetable Insect, Disease and Weed Control (E-827).

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**Harvesting, Handling, and Marketing**

Digging potatoes begins in late June and continues to the end of July. For best quality table stock potatoes, the tubers should be fully matured before digging. Vines may need to be killed by vine beaters or chemicals to promote good skin set. However, since potatoes are edible at any time, the question of when to dig must be decided by the grower. Considerations include price, demand, market conditions, and expected yields. Early potatoes are sometimes dug before optimum maturity to take advantage of certain limited market demands and high prices. Processors may require that a test for reducing sugars be made to determine if tubers are in the acceptable range for chipping into light colored chips.

Potato harvesting is almost fully mechanized. The harvester digs and loads the potatoes on trucks for transport to a shed where tubers are washed, graded, and sized for bulk marketing or packed in bags or boxes. Due to high temperature conditions during harvest, speed is very important in handling the potato crop from digging to loading for shipment. Tubers bruise easily during harvest at temperature above 85°F and below 50° F. Soil condition, tuber condition, and harvester operation are important factors that influence bruising. Besides bruising, other common market defects are cuts, cracks, skinning, enlarged lenticels, heat sprouts, greening, and numerous diseases.

Summer harvested potatoes are not stored or held any longer than necessary before marketing. The best temperature for holding potatoes is 40 to 42° F. Oklahoma potatoes are usually sold on the open market at prevailing prices. Chipping potatoes are normally sold at contract prices and may be graded or ungraded. B size and creamer potatoes are usually sold to processors for canning.

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**Production Handbook**

Potato Association of America Handbook titled “Commercial Potato Production in North America,” 40 pages. Available at $2.50/copy from the America Potato Journal, PICS Building, University of Maine at Orono, Maine 04469.
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