Potato Production

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http://osufacts.okstate.edu

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.

Phosphorus per acre

When test shows	0-19	20-39	40-69	70-99	100 +
Add lbs/A P_2O_5	150	100	75	50	0

Potassium per acre

When test shows	0-99	100-199	200-249	250-299	300 +
Add lbs/A K_2O	300	200	100	50	0

Nitrogen

Apply 75 lbs/A N 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[a]

Skin Color/ Variety	Fungal Diseases				Bacterial Disease
	Fusarium Seed Piece Decay	Early Blight	Verticillium wilt	Common Scab	Blackleg
Red Skinned					
Red LaSoda	MR[b]	MR (foliage) MR (tuber)	MS	MS	MS
Viking	_[c]	S (foliage)	__	MR	__
White Skinned	*[d]				
Kennebec		MS (foliage) MS (tuber)	S	S	MS
Superior	*	S	S	R	__
Russet Skinned					
Norgold Russet	S	S (foliage) R (tuber)	S	R	S

[a] 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.
[b] S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant.
[c] _ indicates no information available.
[d] indicates resistance to one or more strains of the fungus.

planting. Small whole tubers can be used with equal results. Seed pieces should be $1^1/_2$ 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.

Spacing of seed pieces within 36" rows	Seed needed per acre when seed pieces weigh an average of —		
	$1^1/_2$ OZ	$1^3/_4$ OZ	2 oz
		(cwt/acre)	
8 inches	20.4	23.8	27.2
10 inches	16 3	19.0	21.8
12 inches	13.5	15.8	18.1

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 HLA-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

affect yield and quality. On extremely sandy soils it is nearly impossible to prevent the soil from drying below 65% of field capacity due to the low water holding capacity.

Insects

Potatoes should never be planted in fields that have been in sod or grass the previous year. By avoiding this situation, one greatly decreases the chance of having wireworm and grubworm problems. If potatoes are planted in soil that was in sod the year before, a soil insecticide should be used to prevent damage to the tubers from these insects.

Once emerged, potatoes are susceptible to cutworms, flea beetles, and leaflhoppers. Flea beetles and leaflhoppers generally are not major problems in Oklahoma. Cutworms are sporadic problems and can be severe in certain years. Treatment for cutworms is usually performed at planting or just after emergence.

Colorado potato beetles are the major insect problems. The adults overwinter in the soil and emerge about the same time that the potatoes are emerging. They usually appear in mid-April and feed on the young foliage. Eggs are deposited on the lower third of the plant on the underside of the leaves. The larvae appear in mid-May and can cause extensive defoliation. Larvae are more easily controlled when they are small. They also do the least damage when they are small, so controls should be timed to kill the majority of the small larvae present.

Colorado potato beetles can be controlled with systemic soil insecticides or with foliar sprays. Crop rotation also aids in reducing their numbers. Potato fields planted after non-host crops (peanuts, wheat, sorghum, etc.) have fewer beetle problems than fields planted to potatoes the previous year(s). Defoliation by Colorado potato beetles affects potato yields most when the tubers are sizing. Early and late defoliation usually does not decrease yields enough to warrant treatments. Late defoliation, after tuber sizing, can be beneficial from the standpoint of defoliation. The beetles can actually help in the defoliation process and assist in killing the vines.

Other potato insects include aphids, which transmit viruses and can also stress the plants by sucking plant juices. Blister beetles can cause defoliation when they feed as they move en masse across the field; however, they are seldom plentiful enough to warrant treatment.

For specific insect control measures see the latest edition of the Extension Agents' Handbook (E-832) or Commercial Vegetable Insect, Disease, and Weed Control (E-827).

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. *Rhizoctonie 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 EPP-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).

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 rots, 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.

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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