

Potatoes

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Scientific Classification and Description

Potatoes (*Solanum tuberosum*) are part of the Solanaceae family, also known as the Nightshades.² Other vegetables found in the Solanaceae family include tomatoes, peppers, and eggplants. Potatoes are grown for their tubers, which are parts of the plants that are enlarged in order to store nutrients.³

Scientific Classification	
Kingdom	Plantae
Phylum	Magnoliophyta
Class	Magnoliopsida
Order	Solanales
Family	Solanaceae
Genus	<i>Solanum</i>
Species	<i>Solanum tuberosum</i>
Table 1. Scientific Classification of the Potato.¹	

The Andean people of South America had many different names for potatoes. Red potatoes were called “weep blood for the Inca” and hard potatoes were called “knife breaker.”⁴ Some names for other types of potatoes included “human-head” and “red mother.”⁵ The name “potato” originates from the Spanish word “patata,” and the name has been adapted in many different cultures. Some other common names for potatoes include spuds (a slang term for a potato digging spade⁶), taters, murphies, *tatties* (in Scotland), *papa* (in the Americas and certain areas of Spain), *pomme de terre* (in France), *aardappel* (Dutch), *Erdapfel* (in Austria), and

¹ “Potato.” Wikipedia, The Free Encyclopedia. 15 April 2008. 20 April 2008
<<http://en.wikipedia.org/wiki/Potato>>.

² Katz, S.H. (Ed.). 2003. Potato. *Encyclopedia of food and culture* (Vol. 3, pp. 108-116). New York: Charles Schribner, 108

³ “Tuber.” Wikipedia, The Free Encyclopedia. 23 March 2008. 30 March 2008
<<http://en.wikipedia.org/wiki/Tuber>>.

⁴ Meltzer, M. 1992. *The amazing potato: A story in which the Incas, Conquistadors, Marie Antoinette, Thomas Jefferson, wars, famines, immigrants, and french fries all play a part*. New York: Harper-Collins Publishers, 5

⁵ Meltzer, M., 6

⁶ Katz, S.H., 108

Kartoffel (in Germany).⁷ In 16th century France, *pomme* meant fruit, so *pomme de terre* meant “ground fruit.” This name was likely literally translated in other languages, which is why many of the names for potatoes mean “apple of the earth.”⁸

Potatoes grow white flowers with yellow stamens, and buds (also known as eyes) grow on the surface of the tubers. In many varieties, the flowers produced do not bear seeds, although some types of potatoes grow small green fruits that produce seeds that can be transferred by insects to other types of potatoes and cross-pollinate. All potatoes grow low to the ground.⁹

Potato Diseases and Predators

Potatoes are susceptible to many different diseases. Some infect the roots and tubers only, while others infect the leaves. Tuber diseases include Pink Rot (Figure 1), Rhizoctonia (Figure 2), Silver Scurf (Figure 3), Powdery Scab, and White Mold. Pink Rot is caused by a soil-borne fungus called *Phytophthora erythroseptica*.¹⁰ It is characterized by rotted tuber tissues that turn pink after being exposed to air for 20 to 30 minutes. Rhizoctonia is characterized by black scurf or sclerotia visible on tuber surfaces.¹¹ The sclerotia can be variable in size, ranging from very small black specks to large masses that cover a major portion of the tuber.¹² Rhizoctonia can immediately cause the death of the potato, or cause a rot that eventually causes death. If the plant does

⁷ “Potato: Encyclopedia - Potato.” The Global Oneness Commitment. Retrieved 30 March, 2008 <<http://www.experiencefestival.com/a/Potato/id/1896689>>.

⁸ “Potato.” Wikipedia, The Free Encyclopedia. 15 April 2008. 20 April 2008 <<http://en.wikipedia.org/wiki/Potato>>.

⁹ “Potato: Encyclopedia – Potato.”

¹⁰ “Information on other Potato Diseases.” North Dakota State University, Department of Plant Pathology. Retrieved 30 March, 2008 <<http://www.ndsu.nodak.edu/instruct/gudmesta/lateblight/diseases.html>>.

¹¹ “Information on other Potato Diseases.”

¹² “Information on other Potato Diseases.”

not die, the tubers grow too small to be of any use.¹³ Silver Scurf is caused by the fungus *Helminthosporium solani*.¹⁴ It is a “blemish disease of tubers,” which causes a metallic discoloration of the periderm (outer skin) in irregular patterns.¹⁵



Figures 1-3: Pink Rot, Rhizoctonia, Silver Scurf. (“Information on other Potato Diseases”)

Leaf diseases include late blight, early blight, and potato leaf roll. Early blight is the most common potato disease and causes severe defoliation and yield loss.¹⁶ It infects potato leaves as circular grayish brown spots, first as several different spots, then one large spot as they all grow together.¹⁷ The most susceptible potato varieties include Delaware and Russet Burbank.¹⁸

¹³ Grubb, E.H. & Guilford, W.S. 1912. *The potato: A compilation of information from every available source*. New York: Doubleday, Page & Company, 198

¹⁴ “Information on other Potato Diseases.”

¹⁵ “Information on other Potato Diseases.”

¹⁶ Floyd, Robert. “Fungal Diseases of Potatoes.” Organic Gardening from Down Under, Plant Pathology Branch, South Perth Western Australia. Retrieved 30 March, 2008
<http://www.organicdownunder.com/potato_diseases.htm>.

¹⁷ Grubb & Guilford, 175

¹⁸ Floyd, Robert.

The fungus *Phytophthora infestans* is the cause of late blight. This fungus is a common pathogen of potatoes wherever they are grown, but potatoes are more susceptible when the weather is unusually cool and wet. The fungus spores infect the leaves of the potatoes; the tubers and roots are usually more resistant. Under certain conditions, *Phytophthora* can kill off a field of potatoes in just a few days.¹⁹

Phytophthora infestans was also the cause of Ireland's potato famine in the mid-1800s.

There are also several types of insects that are harmful to potatoes. The Colorado Potato Beetle (*Leptinotarsa decemlineata*) is found near the Rocky Mountains and in Eastern Colorado. The beetle feeds and lays eggs on potatoes in the spring, which does damage to early potatoes. The beetles usually die before they can harm late potatoes. The newly hatched beetles feed on the leaves of the potato, and then lay eggs three weeks after they are born. The beetles usually go through two generations every year. Another beetle that is dangerous for potatoes is the Potato Flea Beetle (*Epitrix cucumeris*). These insects swarm potatoes in massive groups and chew small holes in the leaves. The leaves often are so defoliated that the potatoes shrivel. The larvae of the beetles do the more damage to the potato, by destroying young tuber stems, going under the skin of the potatoes, and causing scabs to appear on the potato. A final enemy of the potato is the Potato Eelworm (*Heterodera Radicola*). The eelworm attacks grown tubers, and causes pimples to form on the surface, the potato to soften, and the loss of some nutritional content.²⁰

¹⁹ Volk, Thomas J. "Phytophthora infestans, cause of late blight of potato and the Irish potato Famine." University of Wisconsin-La Crosse. 2001. Retrieved 30 March, 2008 <http://botit.botany.wisc.edu/toms_fungi/m2001alt.html>.

²⁰ Grubb, E.H. & Guilford, W.S. 1912. *The potato: A compilation of information from every available source*. New York: Doubleday, Page & Company, 200-206

Nutritional Aspects of the Potato

Potatoes are a healthy source of nutrition. They are a good addition to an adult's diet, but when fresh they are too bulky to be a beneficial food in children's or infant's diets.²¹

Although the nutrient content varies depending on the variety of potato and the soil and weather conditions under which the potato is grown, all potatoes contain the same basic types of nutrients. Most of the tuber (the part of the potato that is enlarged to store nutrients²²) is water, so only 20% of the tuber is used for food.²³ Potatoes contain complex carbohydrates which are important for energy.²⁴ The starch found in potatoes is very digestible, more than that found in corn and wheat.²⁵ While potatoes are low in protein, they contain large amounts of vitamins B and C as well as ascorbic acid, potassium, phosphorus, iron and magnesium.²⁶ Freshly harvested potatoes have higher quantities of vitamin C than stored potatoes.²⁷ The vitamin C from potatoes can help prevent the disease scurvy if a diet is lacking in fruit.²⁸

One serving (a medium-sized potato) provides 45% of the recommended daily intake for vitamin C, almost no fat, and only 100 calories.²⁹ The modified and fleshy tuber makes the potato have much less fat than other vegetables that develop seeds.

²¹ Kiple, K.F. & Ornelas, K.C. (Eds.). 2000. Potatoes (White). *The Cambridge world history of food* (Vol. 2, pp. 187-201). New York: Cambridge University Press, 196

²² "Tuber." Wikipedia, The Free Encyclopedia. 23 March 2008. 30 March, 2008
<<http://en.wikipedia.org/wiki/Tuber>>.

²³ Grubb, E.H. & Guilford, W.S. 1912. *The potato: A compilation of information from every available source*. New York: Doubleday, Page & Company, 525

²⁴ Katz, S.H. (Ed.). 2003. Potato. *Encyclopedia of food and culture* (Vol. 3, pp. 108-116). New York: Charles Scribner, 108

²⁵ Grubb & Guilford, 8

²⁶ Kiple & Ornelas, 196

²⁷ "Potato: Encyclopedia II - Potato - History and spread." The Global Oneness Commitment. Retrieved 30 March, 2008 <http://www.experiencefestival.com/a/Potato_-_History_and_spread/id/597863>.

²⁸ Zuckerman, Larry. 1998. *The Potato: How the Humble Spud Rescued the Western World*. New York: North Point Press, 7.

²⁹ Katz, S.H., 108

Potatoes also contain salts that make up five percent of the potato and help maintain the alkaline levels in the blood.³⁰ If paired with milk or dairy products to provide calcium and vitamins A and D, the potato can be the anchor to a nutritionally complete diet.³¹ Fingerling potatoes, a small, finger shaped variety of potato, contain fewer toxic chemicals than other varieties and are an excellent source of nutrition.³² It is a common misconception that most nutrients are found in or around the skin; for example, vitamin C is primarily fixed in the center of the potato.³³ The picture below shows the composition of the potato.

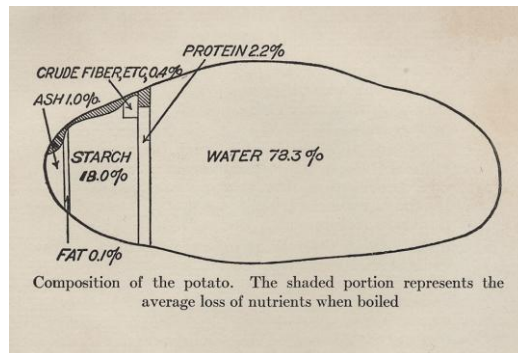


Figure 4. Composition of the potato. (Grubb & Guilford)

Although potatoes are nutritious, there are also toxins present in the potatoes. The natural toxins in potatoes are called glycoalkaloids, and are produced by the plant to protect it from predators such as insects and animals.³⁴ Exposure to direct sunlight can increase levels of glycoalkaloids (natural poisons).³⁵ Solanine (Figure 8) is a glycoalkaloid found in potatoes, and ingesting the toxin can cause symptoms such as

³⁰ Grubb & Guilford, 9-10

³¹ Zuckerman, 7.

³² "Potato: Encyclopedia II - Potato - History and spread."

³³ 1993. "Peel your potatoes to avoid toxins, says Cornell researcher." *Environmental Nutrition*, 16(2), 8.

³⁴ "Greening of Potatoes: Food Science Australia." Food Science Australia. February 2005. Retrieved 30 March, 2008 <<http://www.foodscience.csiro.au/spuds.htm>>.

³⁵ Kiple & Omelas, 196

hypothermia, vomiting, and hallucinations.³⁶ All potatoes contain very small amounts of solanine (1-5 mg), but levels greater than 20 mg (for 100 g of potatoes) make the potato dangerous to eat.³⁷ Solanine is found mostly in green potatoes and new sprouts.³⁸ Cooking cannot eliminate the toxins, so green potatoes should be thrown away.³⁹

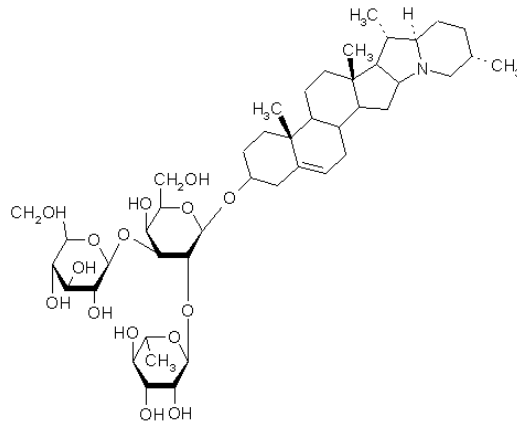


Figure 5. Solanine molecule.⁴⁰

Potatoes can be classified into two types of varieties which have different nutritional aspects. They can be “high dry matter varieties” or “low dry matter varieties.” The amount of “dry matter” is a measure of what is left (mainly starch) after a potato is dried.⁴¹ High dry matter potatoes are “floury in texture, high in food value, high in ‘old fashioned’ flavor and are often more difficult to boil.”⁴² These potatoes are best suited

³⁶ “Potato poisoning - green tubers and sprouts.” MedilinePlus. 21 March, 2006. Retrieved 30 March, 2008 <<http://www.nlm.nih.gov/medlineplus/ency/article/002875.htm>>.

³⁷ Katz, S.H., 114

³⁸ “Potato poisoning - green tubers and sprouts.”

³⁹ “Greening of Potatoes: Food Science Australia.”

⁴⁰ Cook, Steve. “Steve’s Place - Molecules.” Retrieved 16 April, 2008.

<<http://www.steve.gb.com/science/molecules.html>>.

⁴¹ “Nutritional Aspects of Potatoes.” WCF-Phoenix Seed Potato Specialists. Retrieved 30 March, 2008 <<http://www.wcf-phoenix.co.uk/Web/Site/home/NutritionalAspectsofPotatoes.asp>>.

⁴² “Nutritional Aspects of Potatoes.”

for “mashing, baking, microwaving and frying.”⁴³ Low dry matter potatoes are easier to boil and are more scab-resistant so they can be eaten whole and unpeeled.⁴⁴

Potatoes can also come in colors such as purple, red, and blue. The colorful potato varieties are healthier because they contain the antioxidants anthocyanins that have anticarcinogenic properties.⁴⁵ The same antioxidants that give blueberries their color are what make these potatoes colorful.⁴⁶ The white color in some potatoes is caused by the pigment anthoxanthins, which are antioxidants that help prevent cancer. Potatoes have more antioxidants than nearly every vegetable, except broccoli.⁴⁷



Figure 6. Purple Peruvian potatoes.⁴⁸

Potatoes can be very nutritious, but they must be prepared in certain ways to retain their nutritional value. Peeling and boiling removes some of the nutritional content from the potatoes, but the processes are important for getting rid of dirt and pesticides.⁴⁹ As seen in the table below, boiling potatoes retains much of the nutritional content, such as fiber and low amounts of fat. Frying potatoes results in more than 10 times the fat of

⁴³ “Nutritional Aspects of Potatoes.”

⁴⁴ “Nutritional Aspects of Potatoes.”

⁴⁵ “Nutritional Aspects of Potatoes.”

⁴⁶ “Potatoes.” Delicious Organics. Retrieved 30 March, 2008
<<http://www.deliciousorganics.com/recipes/potatoes.htm>>.

⁴⁷ Katz, S.H., 114

⁴⁸ “Purple Peruvian potatoes.” 16 April, 2008. <http://flickr.com/photos/chezpim/477958320/>.

⁴⁹ Kiple & Omelas, 196

boiled potatoes.⁵⁰ In addition to added fat, fried potatoes (in the form of potato chips and french fries) have less than 50% the nutrients of boiled potatoes.⁵¹ A potato peeled at the beginning of processing will have half the fiber. Also, the potato loses vitamin C after being exposed to the air and heat involved in processing potatoes.⁵²

Fried potatoes are not completely devoid of nutrition, but have an excessive number of calories. Health problems arise when people consume french fries as the primary vegetable in their diet, which has become the case much more often in the last few decades.⁵³ Some preliminary studies indicate that acrylamide, a carcinogen, is produced when potatoes are fried, but there is not enough evidence yet to make any recommendations about french fry and potato chip intake.⁵⁴ Currently, manufacturers are using more polyunsaturated vegetable oils, which do not increase cholesterol levels.⁵⁵

The table below shows the composition for different methods of preparing a potato.

KIND OF FOOD	REF-USE Per ct.	WATER Per ct.	PRO-TEIN Per ct.	FAT Per ct.	CARBOHYDRATES		ASH Per ct.	FUEL VALUE PER POUND Calories
					Sugar, Starch, etc. Per ct.	Crude Fibre Per ct.		
Potato, as purchased	20.0	62.6	1.8	0.1	13.8	0.9	0.8	310
Potato, edible portion		78.3	2.2	.1	18.0	.4	1.0	375
Potato, boiled		75.5	2.5	.1	20.3	.6	1.0	440
Potato, mashed and seasoned		75.1	2.6	3.0	17.8		1.5	505
Potatoes fried in fat, "Potato chips"		2.2	6.8	39.8	46.7		4.5	2,675
Potato, evaporated		7.1	8.5	.4	80.9		3.1	1,680
White bread		35.3	9.2	1.3	52.6	.5	1.1	1,215

Figure 7. Composition for Different Preparations of Potatoes. (Grubb & Guilford)

⁵⁰ Grubb & Guilford, 525

⁵¹ Kiple & Omelas, 198

⁵² Meltzer, M. 1992. *The amazing potato: A story in which the Incas, Conquistadors, Marie Antoinette, Thomas Jefferson, wars, famines, immigrants, and french fries all play a part*. New York: Harper-Collins Publishers, 86

⁵³ Smith, A.F. (Ed.). 2004. Potatoes. *The Oxford encyclopedia of food and drink in America* (Vol. 2, pp. 311-315). New York: Oxford University Press, 314

⁵⁴ Katz, S.H., 114

⁵⁵ Meltzer, M., 86

Soil and Climate Requirements

The potato is a remarkable vegetable because it can grow in very poor soil and under less than favorable conditions. They will grow at high altitudes (like those in their ancestral homeland) where there are little nutrients and thin soil.⁵⁶ Potatoes can be grown successfully in soil ranging from light sand to heavy clay.⁵⁷ Although heavier soils may produce more potatoes, the tubers in these soils are more prone to brown rot.⁵⁸ The type of soil doesn't matter too much as long as the land is properly treated. Two of the most important characteristics of the soil is that there is good drainage⁵⁹ and aeration⁶⁰. Loam that is deep and easy to work with is the best soil.⁶¹ The optimal pH level for growth is around 5 or slightly higher, but potatoes can grow in levels of 3.7 and higher. The tubers grow best with moderate ground temperatures and the seeds and flowers grow best with higher temperatures.⁶²

Potatoes grown in drought are lower in both quantity and quality than those grown in moist soil.⁶³ Generally, a 120 to 150 day potato crop needs from 20 to 27.5 inches of rainwater during its growth period. The potato crop is more likely to sustain

⁵⁶ Zuckerman, Larry. 1998. *The Potato: How the Humble Spud Rescued the Western World*. New York: North Point Press, 5

⁵⁷ Grubb, E.H. & Guilford, W.S. 1912. *The potato: A compilation of information from every available source*. New York: Doubleday, Page & Company, 19

⁵⁸ Grubb & Guilford, 24

⁵⁹ Grubb & Guilford, 23

⁶⁰ "The Potato: Cultivation." Food and Agriculture Organization of the United Nations, International Year of the Potato. 2008. Retrieved 30 March, 2008
<<http://www.potato2008.org/en/potato/cultivation.html>>.

⁶¹ Grubb & Guilford, 23

⁶² OECD Environmental Health and Safety Publications. 1997. *Consensus Document of the Biology of Solanum tuberosum subsp. tuberosum (Potato)*. Retrieved 7 February, 2008
<<http://www.oecd.org/dataoecd/25/62/27854542.pdf>>, 22

⁶³ "Growing Washington Potatoes." Washington State Potato Commission. 2008. Retrieved 30 March, 2008 <<http://www.potatoes.com/GrowingPotatoes.cfm?Section=Growing-Growing.cfm>>.

damage and result in a small yield if it gets insufficient water later in the growth process rather than earlier in the growth process.⁶⁴

Potatoes have been grown in nearly every country that fits the temperature requirements.⁶⁵ They can grow in temperatures ranging from moderate to tropical. The best day temperatures for tuber growth are 18 to 20 degrees Celsius, and night temperatures are best at below 15 degrees.⁶⁶ The tuber of the potato cannot live at temperatures under -3 degrees Celsius. Tubers will die if they are in frost for more than 25 hours at -2 degrees. The leaves of the potato will get frostbite at temperatures under -4 degrees Celsius.⁶⁷

At its place of origin, the potato grows in the sunshine for many hours, although the nights are cool. There is little rain during the growth period (not drought conditions), and the air in the mountains is fresh and revitalizing.⁶⁸ Varieties of potato grown in Latin America are more resistant to frost than potatoes grown elsewhere.⁶⁹

Geographic Distribution and Origin (and the Irish Potato Famine)

Some scientists believe that wild potatoes grew in Chile approximately 13,000 years ago before any human agriculture. The wild potato is most diverse in the Lake Titicaca region of Peru and Bolivia where it was domesticated between 10,000 and 7,000 years ago.⁷⁰ No later than 7,000 years ago, Andean peoples farmed potatoes.⁷¹ The blue

⁶⁴ “The Potato: Cultivation.”

⁶⁵ Grubb & Guilford, 18

⁶⁶ “The Potato: Cultivation.”

⁶⁷ OECD Environmental Health and Safety Publications, 22

⁶⁸ Grubb & Guilford, 17

⁶⁹ OECD Environmental Health and Safety Publications, 22

⁷⁰ Kiple, K.F. & Ornelas, K.C. (Eds.). 2000. Potatoes (White). *The Cambridge world history of food* (Vol. 2, pp. 187-201). New York: Cambridge University Press, 188

potatoes of today most are the most similar to the original potatoes, although there were many different kinds of potatoes in the Andean peoples' diet.⁷² These people grew potatoes on the mountains because their usually foods of manioc and maize would not grow in the mountain's climate.⁷³ The farmers used tacllas, wooden spades with footrests, for growing the potatoes.⁷⁴

The potato was the main source of altiplano peoples' diet (people who live where the Andes are at their widest, which occupies parts of Chile, Argentina, Bolivia, Peru and Ecuador).⁷⁵ They frequently made use of the potato because it was easy to tend to and bore many tubers to one plant. The Spanish took advantage of the potato's high water content (80%) in preparing their potatoes. They squeezed all of the water out of the plant to obtain chuño, a freeze dried potato.⁷⁶ Tubers are frozen at night and then warmed in the sun. Then they are trampled to remove the skins and any residual water.⁷⁷ It can be softened in boiled water and quickly made ready to eat. The best part about chuño is that it can be stored for up to 10 years – very useful in case of a famine.⁷⁸

⁷¹ Zuckerman, 4

⁷² Weinstein, B. & Scarbrough, M. 2003. *The ultimate potato book: Hundreds of ways to turn America's favorite side dish into a meal*. New York: Harper-Collins Publishers, 3

⁷³ Meltzer, M. 1992. *The amazing potato: A story in which the Incas, Conquistadors, Marie Antoinette, Thomas Jefferson, wars, famines, immigrants, and french fries all play a part*. New York: Harper-Collins Publishers, 9

⁷⁴ The Great Potato Book p. 2

⁷⁵ "Altiplano." Wikipedia, The Free Encyclopedia. 16 March 2008. 30 March, 2008
<<http://en.wikipedia.org/wiki/Altiplano>>.

⁷⁶ Zuckerman, 6

⁷⁷ Kiple & Omelas, 189

⁷⁸ Zuckerman, 6



Figure 8. Chuño processing.⁷⁹

The potato is estimated to have reached Spain around 1570, although the Spanish conquistadors first encountered potatoes in 1530.⁸⁰ The Spanish did not think it was important to bring the potatoes back to Spain immediately⁸¹, and when potatoes were first brought back they were primarily treated as ornamental plants that inspired fear, similar to the Venus Fly Trap today.⁸² From Spain the potato spread to Italy and then England. However, because the potato was so easy to grow and cultivate, the Europeans initially viewed it as “food for the poor.”⁸³ In the first half of the 17th century, potatoes were primarily eaten by the poor and soldiers in Spain.⁸⁴ Potatoes first became popular in Spain by accident. The Spaniards already ate sweet potatoes, and figured if those were acceptable to eat, other types of potatoes were acceptable too. They assumed sweet potatoes and potatoes were simply different versions of one crop, instead of being completely different species.⁸⁵

⁷⁹ “Chuno processing.” 16 April, 2008. <http://flickr.com/photos/nygus/1773443385/>.

⁸⁰ Kiple & Omelas, 190

⁸¹ Fabricant, F. 2000. *The great potato book*. Toronto: 10 Speed Press, 2

⁸² Weinstein & Scarbrough, 3

⁸³ Zuckerman. 7

⁸⁴ Encyclopedia of Food and Culture, 110

⁸⁵ Weinstein & Scarbrough, 4

The potato reached colonial North America in 1613. It came via Bermuda from Europe and reached the mainland in 1621.⁸⁶ The destination was probably Canada because there is no evidence of the potato being grown in America before 1685.⁸⁷ The Irish helped the potato take root in American soil since Irish Quakers were among Pennsylvania's early settlers.

The Irish were the first Europeans to accept the potato as a field crop in the 17th century.⁸⁸ There is no proof as to how the potato reached Ireland, but there is one reasonable theory. An Irish legend states that in the 1590s, Sir Walter Raleigh brought the tubers from England to an estate he owned in Ireland.⁸⁹ He gave tubers to his gardener who planted them not knowing they were potatoes and mistakenly ate the toxic berries from the stalks.⁹⁰ There is no proof that this story is true, and in fact it may have simply been a Spanish sailor who brought the potato to Ireland. Many historians believe that the first potatoes were planted in County Wicklow in the 1640s.⁹¹

The potato became popular in Ireland because it produced many tubers and could be grown and stored underground.⁹² By 1650 it became a staple food and replaced wheat as the major crop.⁹³ The potato saved Ireland from famine as early as 1728, and also in 1729 and 1740.⁹⁴ Between 1780 and 1841, the population doubled in Ireland due to the

⁸⁶ Zuckerman. 88

⁸⁷ Zuckerman. 88

⁸⁸ Katz, S.H. (Ed.). 2003. Potato. *Encyclopedia of food and culture* (Vol. 3, pp. 108-116). New York: Charles Scribner, 111

⁸⁹ Katz, S.H., 110

⁹⁰ Zuckerman. 19

⁹¹ Fabricant, F., 5

⁹² "Potato: Encyclopedia II - Potato - History and spread." The Global Oneness Commitment. Retrieved 30 March, 2008 <http://www.experiencefestival.com/a/Potato_-_History_and_spread/id/597863>.

⁹³ "Potato: Encyclopedia II - Potato - History and spread."

⁹⁴ Fabricant, F., 5

wide acceptance of the potato.⁹⁵ Irish men grew their thumbnails long in order to better scrape the peel off a boiled or baked potato.⁹⁶ But in 1845, potato blight (*Phytophthora infestans*, Figure 9) destroyed 40% of the crop.⁹⁷ At this time, an average of 5.5 pounds of potatoes was consumed daily by each resident.⁹⁸

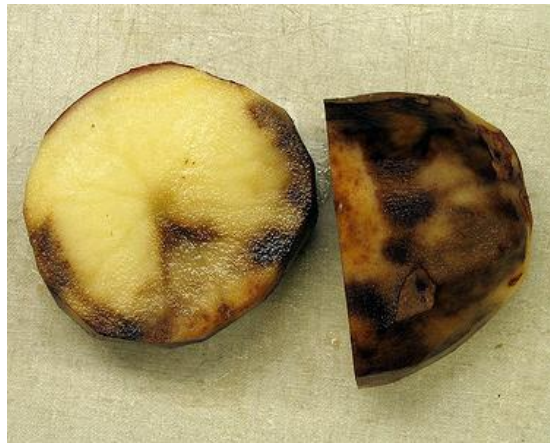


Figure 9. Late blight of potato caused by *Phytophthora infestans*.⁹⁹

Although Ireland grew other crops, most of them were exports to Europe and were too expensive for the Irish to afford.¹⁰⁰ Even during the famine, Ireland remained an exporter of food.¹⁰¹ In 1846 the blight destroyed 90% of the potatoes, and the fungus reappeared in full force in 1848-1849.¹⁰² People tried to prevent the spread of the disease by cutting the black stalks, setting fires to clean the air, pouring holy water on the fields, and putting stones over the fields to bury the disease, but nothing worked. The disease was even able to spread to stored potatoes in the barns.¹⁰³ More than a million and a half

⁹⁵ Katz, S.H., 111

⁹⁶ Fabricant, F., 5

⁹⁷ Katz, S.H., 111

⁹⁸ Fabricant, F., 5

⁹⁹ "Late blight of potato." 16 April, 2008. <http://flickr.com/photos/benmillet/281344513/>.

¹⁰⁰ "Potato: Encyclopedia II - Potato - History and spread."

¹⁰¹ "Potato: Encyclopedia II - Potato - History and spread."

¹⁰² Kiple & Omelas, 193

¹⁰³ Meltzer, M., 48

Irish people either died or emigrated in search of food.¹⁰⁴ The Irish Potato Famine is the first example of what can happen when a country relies too heavily on a monoculture).¹⁰⁵

In the 18th century, the potato increasingly became popular in other areas of Europe, particularly France. In 1757, a pharmacist named Antoine Parmentier succeeded in making potatoes popular in France. Parmentier had eaten and liked potatoes when he was a prisoner in Germany during the Seven Years War. Parmentier invited famous people such as Benjamin Franklin over to his house to try to increase the popularity of the potato, and also played a legendary trick on the Parisians. He planted potatoes near Paris, and placed guards around the plot to keep watch during the day. At night, the potatoes were left unguarded, and neighbors started stealing potatoes because they thought the crop must be valuable if there were guards around it. These neighbors started to plant potatoes in their own gardens, and the popularity of the crop grew.¹⁰⁶

Potatoes began to spread elsewhere as well. The Portuguese brought them to Africa, and in the 18th century the French brought potatoes to India and China.¹⁰⁷ Today, China is the largest producer of potatoes, and the potato harvest represents a 100 billion dollar industry worldwide.¹⁰⁸

History of the crop in early 19th-century America

The potato became a “powerful fixture in American domestic life” in the 18th century.¹⁰⁹ Even though only one variety was popularized in 1806, by 1848 about 100 varieties were

¹⁰⁴ Kiple & Omelas, 193

¹⁰⁵ Fabricant, F., 5

¹⁰⁶ Meltzer, M., 29-30

¹⁰⁷ Fabricant, F., 7

¹⁰⁸ Fabricant, F., 9-10

¹⁰⁹ Zuckerman, Larry. 1998. *The Potato: How the Humble Spud Rescued the Western World*. New York: North Point Press. 232

shown at a fair.¹¹⁰ Luther Burbank discovered in 1872 that the Early Rose potato produced a “seed ball,” which helped develop a way to breed potato plants with large tubers. The result of this was the Burbank potato (which eventually became the Idaho).¹¹¹

The potato was omnipresent during the first half of the 19th century: many settlers listed the potato in their diaries or memoirs as one of the few things they started out with when setting up house or farm.¹¹² Henry Harmon Spalding, a Presbyterian missionary, brought potatoes to Utah and tried to teach the Nez Perce Indians how to grow the crop. The first potatoes were grown successfully in Utah in 1838.¹¹³ One British miner wrote that San Francisco in 1851 had few vegetables, so potatoes and onions were the “stand-by.”¹¹⁴ Another reason why potatoes were so abundant was that they were cheap.¹¹⁵

Potato commerce (buying and selling of potatoes) entered the Census in 1840, but declined in 1843 due to blight.¹¹⁶ The blight did not wipe out all early varieties, but decreased the number of potatoes dramatically. By the end of the 18th century, potatoes were used only as food for cattle and slaves.¹¹⁷ Chauncey E. Goodrich rehabilitated the potato by going to South America to get new seed. He grew Rough Purple Chile, which eventually became Russet Burbank. In 1853 he also bred a potato called Garnet Chile.

¹¹⁰ Katz, S.H. (Ed.). 2003. Potato. *Encyclopedia of food and culture* (Vol. 3, pp. 108-116). New York: Charles Scribner, 113

¹¹¹ Katz, S.H., 113

¹¹² Zuckerman. 235

¹¹³ Fabricant, F. 2000. *The great potato book*. Toronto: 10 Speed Press, 6

¹¹⁴ Zuckerman. 234

¹¹⁵ Zuckerman. 237

¹¹⁶ Smith, A.F. (Ed.). 2004. Potatoes. *The Oxford encyclopedia of food and drink in America* (Vol. 2, pp. 311-315). New York: Oxford University Press, 311

¹¹⁷ Fabricant, F. 2000. *The great potato book*. Toronto: 10 Speed Press, 6

Eight years later, Garnet Chile led to the development of the varietal known as Early Rose.¹¹⁸

The potato chip was accidentally invented in Saratoga Springs, NY in the early 1850s. A disgruntled patron at Half Moon Hotel supposedly sent his fried potatoes back to the chef saying they were too thick.¹¹⁹ The chef then sliced the potatoes very thin, fried them in fat, and salted them to get back at the customer. But the patron loved them, and the potato chip, known as Saratoga chips at the time, became a new product.¹²⁰

The potato's popularity increased even more after it was cultivated in Idaho, currently the largest potato producer in the United States. A group of Mormons brought the potato to Franklin, Idaho in 1860. The growing conditions in Idaho are excellent for potatoes, with the moist soil, sunny days, and cool nights, which is why the potato flourished in the state.¹²¹

Identification of varietals for the 1812 Garden (and current varietals)

US potato breeding did not really start until after 1850; before then, European varieties would have been grown.¹²² However the variety "Early Rose" was developed in the mid 1800's.¹²³ Some other early potato varieties include the Irish Apple (1770)¹²⁴, and Irish Cobbler (1876).¹²⁵ One of the earliest varieties found is Stafford Hall from 1827 (also

¹¹⁸ Zuckerman. 239

¹¹⁹ Katz, S.H, 115

¹²⁰ Zuckerman. 241-242

¹²¹ Fabricant, F., 6

¹²² Walter DeJong, Cornell University (personal communication, February, 2008)

¹²³ Walter DeJong, Cornell University (personal communication, February, 2008)

¹²⁴ Zuckerman. 32

¹²⁵ Grubb & Guilford, 40-41

known as Late Wellington).¹²⁶ Late Varietals (potatoes that grow later in the season) include Burbank, Green Mountain, Rural New Yorker, and Peerless. The picture below shows some Standard Early Varietals (potatoes that grow early in the season).

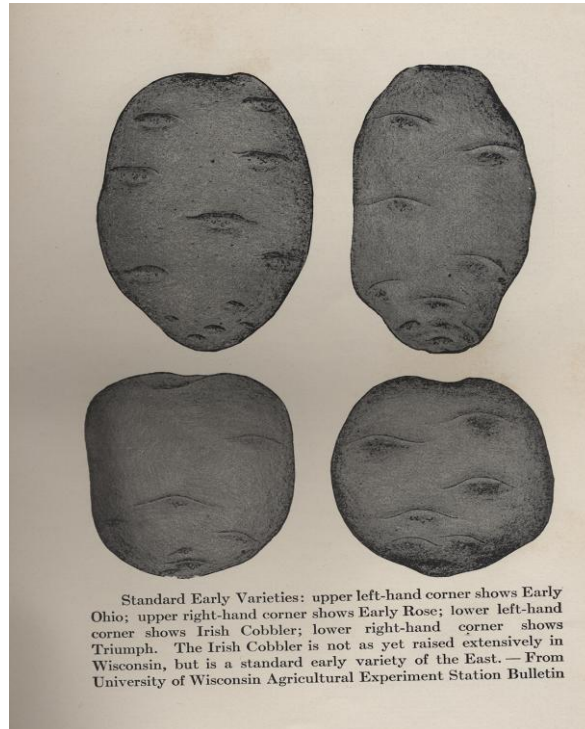


Figure 10. Standard Early Varieties. (Grubb & Guilford).

Current varieties vary in different continents. In North America, the common varieties are Russet Burbank (also known as Idaho Potato), Yellow Finn, Red Gold, German Butterball, and Yukon Gold. In Britain, current varieties include Maris Piper, King Edward, Desire, International Kidney, Pink Fir Apple, Golden Wonder, and Kerrs Pink. Other varieties include Amandine (from France) and Jersey Benies, Red Kings, and Kipler. Peru has more than 4200 varieties of potatoes, making them the world's number one producer.¹²⁷

¹²⁶ Grubb & Guilford, 40-41

¹²⁷ "Potato: Encyclopedia II - Potato - History and spread."

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