

Potato Power! Exploring The World Of Potatoes

TEACHER GUIDE (Grade 3)

Agriculture is an essential industry we all rely on to provide us with food. Potatoes have an interesting history to explore and today, are one of the world's most popular foods to eat.

Agriculture in the Classroom - Manitoba invites your students to learn more about this vital industry and explore the history of potatoes, how they originated, the physical characteristics of a potato, and how they grow.

Purpose: Students will learn about the history and geography of the potato. Students will also explore the life cycle of a potato and learn about how it grows.

GRADE 3 ACTIVITIES - CURRICULUM OUTCOMES

Curriculum Outcomes - Grade 3 Social Studies		Activity	
		#1: Potato Geography	#2: Growing a Potato
3-S-200	Select information from oral, visual, material, print, or electronic sources. Examples: maps, atlases.	✓	
3-KG-030	Describe similarities and connections between communities around the world.	✓	
3-VG-010	Appreciate their connections to people and communities elsewhere in the world.	✓	
3-KL-020	Locate communities or countries studied on a world map or globe.	✓	
3-KL-017	Describe the influence of natural phenomena on ways of life in communities studied. Examples: climate, vegetation, natural resources, landforms, floods, droughts, storms.	✓	

Curriculum Outcomes - Grade 3 Science			
3-0-5B	Use tools to observe, measure, and construct.		✓
3-0-5C	Estimate and measure mass/weight, length, volume, and temperature using standard units.		✓
3-1-01	Use appropriate vocabulary related to their investigations of growth and changes in plants. Include: growing medium, nutrient, energy, root, stem, leaf, flowers, pistil, stamen, ovule, pollen, seed, fruit, adaptation, life cycle		✓
3-1-04	Conduct experiments to determine conditions needed for healthy plant growth. Include: light, water, air, space, warmth, growing medium, nutrients		✓
3-1-10	Care for a flowering plant throughout its life cycle, tracking its growth, and its changes over time.		✓

AGRICULTURAL CONNECTIONS: LET'S LEARN ABOUT POTATOES!

The potato is not a root but a storage area that forms part of the plant's underground stem. Vigorous potato plants that have plenty of sunlight, water, and nutrients from the soil produce more energy than the growing plant can use at one time. The plant stores the excess energy in oval packages, called tubers (the potatoes). These tubers provide the plant with energy to regrow in the spring. When the plant's greenery starts to wither and turn brown, the potatoes are ready to harvest.

After they are harvested, potatoes can be stored for two to three months and will remain in a dormant state if kept in a cool, dark location. When moved to a warmer place, potatoes will begin to sprout in one to three weeks. Sprouts grow from the "eyes" of the potato, which are nodes on the enlarged, underground stem. Each node can develop into a branch that can grow up through the soil and emerge into a green, leafy

shoot. As the branches grow, they use up the energy from the original seed potato, which will shrink and shrivel as its starch is consumed. Soon the branches of the plant will grow bushy and have many new leaves that all produce energy through photosynthesis. At this point, new potatoes will begin to form on the underground sections of the branches that grew upward from the seed potato.

There are thousands of varieties of potatoes. Potatoes come in different colors, including white, red, russet, yellow, and blue. Different varieties also mature at different times and can be broadly grouped as early, mid, and late-season potatoes. Yukon Gold is a common early-season variety that matures in approximately 90 days, although new potatoes can be harvested as early as 60 days. Russet Burbank is one of the most common potato varieties, and it is a long-season variety, taking 120-140 days to mature. Potatoes are an excellent plant to grow in a school or home garden. The plants grow quickly, and it is exciting to unearth tender, new potatoes that can be turned into many familiar and tasty dishes.

Potatoes produce more pounds of protein per acre than corn, rice, wheat, or oats. They are packed with nutrients, low in fat, generous in bulk, and efficiently packaged in their own skins. They can be prepared in many ways and are delicious.

Potatoes were first grown by ancient tribes living in the Andes Mountains of Bolivia and Peru as early as 200 A.D. Archaeologists have found pictures of potato plants in designs on ancient pottery. The ancient people preserved the potatoes by trampling them and then drying them.

Even though potatoes were first grown in South America, settlers in North America did not start eating them until after they became a popular food in Europe. European explorers carried potatoes from South America to Europe in 1570. About 150 years later, the rulers of several European countries ordered their people to start growing potatoes. In Ireland, potatoes became a staple food for the people. In the 1840's, disease wiped out the potato crop in Ireland for several years in a row. Many Irish people moved to North America then, because they had no food to eat.

We also grow potatoes in Canada! In 2016, Canada ranked as the world's 18th largest potato grower, with an output of just over four million tonnes. Prince Edward Island produces the highest amount of potatoes across the provinces, followed by Manitoba and then Alberta. Potatoes account for about 36 percent of all fresh and processed vegetables consumed in Canada.

In 2017, 65% of Canadian potatoes were sold to processors to make French fries, chips, and other products. Potato processing is a large part of Manitoba's agricultural industry. Fresh potatoes accounted for 21% of sales. Before fresh potatoes go to market, they are graded according to size and quality. The price of the potato depends on how it looks and how much it weighs. Seed potatoes account for the remaining 14% of potatoes produced.

Today, China produces more potatoes than any other country in the world. In the mountainous regions of northern China, potatoes are both a staple food and an important source of income for rural households. In neighbouring India, potatoes are less of a rural staple, but they are an important cash crop, providing significant income for farmers.

Indian farmers grow potatoes during the winter season when days are shorter. India, Russia, Ukraine and the United States follow China in production.

COVID-19 has had a big impact on Canadian potato farmers and processors, including those in Manitoba. Demand for French fries has greatly decreased due to the closure of restaurants. Farmers were unable to sell their remaining 2019 potatoes still in storage, and then had to decide in the spring of 2020 if they should invest in growing a potato crop. So, while they did their best to divert surplus 2019 potatoes to the fresh market and food banks, they also grappled with whether they could remain in the business of growing potatoes.

ENGAGEMENT IDEAS

- Hold up a potato for students to see. Try showing a few different varieties and talk about the differences (physical attributes, growing cycle and length, how you can prepare them in recipes, etc). Ask if they can tell you what it is and what people use it for.
- Make a list on the board of all the different ways students can think of to eat potatoes. Ask how many recipes they think there are for cooking potatoes.
- Do a live Google search for potato recipes and show students how many results there are (millions!).
- Ask students if they can tell you where potatoes come from. Prompt them to discuss that potatoes grow from plants that are cultivated by farmers and gardeners. Explain that they will be learning more about potatoes and where they come from in the following lesson.

ACTIVITY 1 – POTATO HISTORY AND GEOGRAPHY

PROCEDURE:

- Watch the video ‘[History Through the Eyes of the Potato](https://www.youtube.com/watch?v=xROmDsULcLE)’ by Leo Bear-McGuinness, TED-Ed (3 mins : 46 secs) <https://www.youtube.com/watch?v=xROmDsULcLE>
- Give each student a copy of the [Potato History Worksheet](#).
- Students will read the excerpt and complete the attached **Test Your Potato Knowledge** questions.
- Discuss with students what they learned about the origin and history of potatoes.
- As you are discussing the origin and history of potatoes, provide each student with a [World Map](#) and instruct them to:
 - » Locate and colour in with a highlighter/marker Bolivia and Peru. Then, using small triangles (i.e. ^^^) draw in and label the Andes Mountains in South America. This is where the potato was first domesticated. A great variety of potatoes is still grown in this region.
 - » Draw a line connecting South America to Europe. Early Spanish explorers brought potatoes to Europe, but it took some time for Europeans to develop a taste for potatoes.
 - » Colour in all the countries potatoes spread to in Europe. Include Spain, Portugal, Italy, Austria, Belgium, Holland (The Netherlands), France, Switzerland, Germany, Russia, England, and Ireland.
 - » Draw a line connecting Europe to Canada. European explorers and settlers first brought potatoes to Canada in the 1600 – 1800’s.
 - » Locate and highlight Ireland. From 1845 to 1852 there was mass starvation, disease, and emigration from Ireland due to the failure of potato crops.
 - » Locate and highlight China, India, Russia, and Ukraine. China is now the world’s top potato producer, followed by India, Russia, and Ukraine. In 2016, Canada was the 18th largest potato producer in the world.
 - » Label the top 3 potato producing provinces in Canada: PEI, Manitoba, and Alberta.
- Potatoes grow best in cool climates with fertile soils. Have students compare the geography of different potato-growing regions of the world.
 - » Using a relief map, look at the terrain of Bolivia, Peru, and PEI, Manitoba, and Alberta to see what they have in common. Then, look at and compare that to the terrain of China, India, Russia, and Ukraine.
 - » Compare and contrast these places to find what features they have that would make potatoes an important crop there (e.g. climate, landscape). You may wish to use the [National Geographic Mapmaker](#) which includes layers for climate, weather, land cover, and food (including potato production!)
 - » Discuss cultural, economic, and social factors that might affect potato production in these different countries. For example, India does not have a cool climate, but there is demand for potatoes, which means farmers can make money by growing them.

MATERIALS NEEDED:

- Projector screen to view online video.
- [Potato History Worksheet](#)
- [World Map](#), 1 per student

Extension video option – if you would like to learn more about potatoes and their history, watch the video ‘[How Potatoes Saved the World](#)’ (15 mins, 47 secs).

https://www.youtube.com/watch?v=o1L6P_kMNzY

Potato History Worksheet – Answer Key

1. Carbohydrates, protein, fibre, potassium, vitamin B and vitamin C.
2. Andes Mountains in South America
3. Wild potatoes are smaller, narrower and gnarlier than today’s potatoes. Wild potatoes were also poisonous.
4. Peru and Bolivia
5. The Incas made chuño from potatoes. Chuño could last up to 10 years without refrigeration so it provided food in years with bad harvests. It was also very nutritious as well as light and easy to carry so it was the main food for Incan armies.
6. Spanish conquistadors brought potatoes back to Spain.
7. The potato crop often survived when grain crops failed. The potato also provided people with more calories and nutrition than grain.
8. A potato disease commonly called late blight arrived in Ireland and ruined the potato crop for 7 years. This caused the Irish Potato Famine, or the Great Hunger, and many Irish moved away because to stay meant they would starve.
9. Europeans
10. Prince Edward Island, Manitoba, and Alberta
11. Pesticides
12. a. Genetically engineered
b. GE potatoes have a gene that protects them from getting sick with late blight.
13. Celebrities and reasons will vary.

ACTIVITY 1 – EXTENSION ACTIVITY: ‘POTATOES THROUGH THE AGES’ DRESS UP CONTEST

PROCEDURE

1. Create ‘Potatoes Through the Ages’ art! Give each student a potato, access to art materials, and the following directions:
 - » Choose a country discussed in the previous activity, such as Ireland in the 1800s, ancient Peru, France in the 1700s, or modern India.
 - » Research how people traditionally dressed (or commonly dress) in your chosen area and time.
 - » Dress up your potato (without cutting it) in the traditional or common dress of your chosen area. You may dress it in a costume, paint it, add different things to it, etc.
2. After students have finished dressing up their potatoes, give each student an index card, and ask them to write the following on it:
 - » Potato’s name
 - » Where and when is your potato from?
 - » Short description (one to three sentences) of what your potato is wearing
3. Place all dressed up potatoes in an area where students can see them and have students vote on their favourites. Take a picture and post it on Facebook @Agriculture in the Classroom – Manitoba or on Instagram @aitcmb.
4. When you’re finished with your potatoes, undress them and either compost them to create nutrient-rich soil, or try this fun activity to make potato starch glue: <http://www.prittworld.com/uk/www/en/consumer/about-pritt/pritt-history-sustainability/natural-gluing-power/make-glue-experiment.html>

MATERIALS NEEDED:

- Potatoes, 1 per student
- Art materials (paint, fabric scraps, glue, pipe cleaners, toothpicks, paper, markers)
- Index cards, 1 per student

ACTIVITY 2 – GROWING A POTATO

PROCEDURE

1. Watch the video ‘[Potato – How Does it Grow?](https://www.youtube.com/watch?v=lkJoaJNzfig&feature=youtu.be)’ (5 mins : 58 secs)
<https://www.youtube.com/watch?v=lkJoaJNzfig&feature=youtu.be>
2. Provide each student with 10 copies of the [Potato Journal Template](#) and ask them to cut out each one. Explain that they will be using these cut-outs to make a journal, and they should colour the front and back covers. Ask them to write their names and then write the title “Potato Journal” on their front covers. Then staple the cut-outs together on the top or left side.
3. Place one of the large baking potatoes on a paper plate in a location where students can easily make observations.
4. Ask students to examine the potato and describe it on the first page of their journals. They should make sure to note the date on which observations are made.
5. Let students know they will be documenting their observations of the potatoes in their journals at regular intervals (e.g. once a week). Students could use tools to make measurements such as:
 - » The mass of the original seed potato compared to the mass of the new potatoes produced
 - » The change in the length of the sprouts each week on the unplanted potato
 - » The change in the length of the green sprouts each week on the planted potatoes
6. Take a minute to read the [Agricultural Connections: Let’s Learn About Potatoes!](#) excerpt on page 2. Considering what you already learned in the ‘[Potato – How Does it Grow?](#)’ video, discuss how potatoes grow with students.
7. Explain to students that they will observe the potato to find the number of days that pass before the eyes begin to sprout. The potato contains enough nutrients, energy, and water for the plant to begin to grow without any soil.
8. Tell students that they will also observe a potato planted in soil and compare its growth to that of the potato with no soil. Show students the bag of potting soil and ask them if it is living or nonliving. Point out that the soil contains nonliving nutrients that the potato will use as it grows.
9. Plant and care for the potato as follows
 - » Fill the pot approximately one-quarter full of potting soil. Place the potato on top of the soil and cover with three to four inches of soil or until the pot is about half full.
 - » Position light to shine on pot.
 - » Water lightly. Do not over-water or the potato may rot. After green sprouts appear, pay attention to the soil moisture and water when dry.
 - » As shoots appear and get tall, cover them with more soil, and tie them to a stake.
 - » When flowers start to appear, stop watering to prevent the potatoes from rotting.
 - » As the potato grows, it may push up the dirt around the stem or even crack the container in which its planted.

MATERIALS NEEDED:

- Projector screen to view online video.
- 2 large potatoes (preferably an early-maturing variety like Yukon Gold)
- [Potato Journal Template](#), 10 copies per student
- Paper plate
- Large pot, any container that is at least 12” deep and 12” wide with drainage holes will work. (To take this to the next level, try sourcing a clear plastic container and planting right near the side. Cover the sides of the container with paper or cloth as sunlight will damage the potato tubers. Students can peek underneath the covering to check on the potato growth under the soil.)
- Potting soil to fill the pot. (Choose a potting soil that contains nutrients to feed for at least two months)
- Lamp or lights. (Any lamp or light that can be positioned to shine closely and directly on the growing potato will work)
- Watering can/pitcher

- » After six to eight weeks, when the potato plant has finished flowering or the top starts to die, harvest the potatoes by gently pulling the plant out of the pot.
 - » Lay the plant on newspaper.
 - » Have students sift through the dirt to find any potatoes left behind in the pot.
10. As the potatoes grow, or after harvesting the first new potatoes from the potted plant, discuss the differences that students observe between growing a potato with and without soil. Discuss the importance of soil to plants as an example of the interaction between living and nonliving things. Ask students if they can think of any other nonliving things that affect plants (e.g. light, water, temperature).

ACTIVITY 2 – EXTENSION ACTIVITY: POTATO LIFE CYCLE FLIPBOOK

(to be completed following the [Growing a Potato Activity](#) above)

PROCEDURE:

1. Each student can colour their own [Potato Life Cycle Flipbook](#). Then, cut out each page and staple them together in order. Flip the pages to watch the potato plant grow!

MATERIALS NEEDED:

- Copies of the [Potato Life Cycle Flipbook](#), 1 per student

REVIEWING WHAT YOU HAVE LEARNED:

- Potatoes are living things that depend on nonliving things, like sunlight and soil nutrients, to grow.
- Potatoes are an important food, grown and eaten by many different cultures around the world.
- Agriculture is one way that people use the physical environment.
- Geography affects what crops can be grown in an area; potatoes grow best in cool climates.
- Potatoes were first domesticated in South America, and they greatly affected European history years after being brought there by the first explorers.

SOURCES:

The above lessons/activities have been adapted from National Agriculture in the Classroom and AgScape. Other sources used listed below:

- Agriculture and Agri-Food Canada: <https://agriculture.canada.ca/en>
- CTV News: <https://www.ctvnews.ca/health/canada-approves-three-types-of-genetically-engineered-potatoes-1.3531998#:~:text=The%20three%20varieties%20of%20potato,to%20the%20Irish%20potato%20of%20famine.>
- Farmer's Almanac: <https://www.farmersalmanac.com/parmentier-made-potatoes-popular-28537#:~:text=The%20Not%2DSo%2DHot%20Potato&text=Pin%20It!,-Antoine%2DAugustin%20Parmentier&text=Along%20came%20-Antoine%2DAugustin%20Parmentier,potatoes%20as%20his%20prison%20orations.>
- Geri Walton: <https://www.geriwatson.com/man-who-made-potatoes-popular-in-france/>
- History Magazine: <http://www.history-magazine.com/potato.html>
- International Potato Center: <https://cipotato.org/blog/indicators-show-potatoes-can-grow-mars/>
- Ireland's Great Famine, 1845-1849, Prelude to Famine 4: Demographics: https://www.wesleyjohnston.com/users/ireland/past/famine/demographics_pre.html#:~:text=Prelude%20to%20Famine%204%3A%20Demographics&text=By%201841%2C%20the%20population%20had,famine%20that%20began%20in%201845
- NASA: <https://www.nasa.gov/vision/earth/everydaylife/spacespuds.html>
- PEI Potato History: <https://www.peipotatoblossomfestival.com/potato-history>
- Potato Pro: www.potatopro.com
- Smithsonian Magazine: <https://www.smithsonianmag.com/history/how-the-potato-changed-the-world-108470605/>