



# Potato Fields Forever

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**Grade Level:** 3

## **Description**

In this lesson you will find out how many potatoes your school eats in a week and determine how many potatoes you would need to plant, and how much area it would take.

**Follow up** from “Potato Proliferation” in which students planted a potato bed.

## **Background Information**

Massachusetts plants a lot of potatoes! In 2010 farmers in the state planted 3.7 thousand acres of fall potatoes. Our Massachusetts soils are well suited to potatoes, and we have many large potato farms, particularly in the deep loamy soils of the Connecticut river valley.

The potato (*Solanum tuberosum*) is an annual vegetable that grows up to 40 inches tall and produces a tuber - the potato - which is rich in starch and other nutrients. Potatoes are the world's fourth most important food crop, after corn, wheat and rice. The potato is in the Solanaceae - or "nightshade"- plant family, and shares the genus *Solanum* with at least 1,000 other species, including tomatoes and eggplants.

The potato tubers grow by manufacturing starch in their leaves that is then transferred to the ends of their underground stems (or stolons). The stems then thicken to form potatoes. The number of tubers that reach maturity depend on the available moisture and soil nutrients to the plant.

In the fall, the plant leaves and stems die down to the surface of the soil, and the new tubers eventually detach from their stolons. The tubers then serve as a nutrient store that allows the plant to survive the cold and later regrow and reproduce. Each tuber has between two to ten buds (or "eyes"), arranged in a spiral pattern on its surface. If left in the ground, when spring conditions are right, the buds will generate shoots that grow into new plants.

## *History*

Over two hundred species of wild potatoes are found in the Americas! Potatoes were first cultivated and grown as a food crop in the central Andes. Here, over millennia, farmers selected and improved an amazing range of tuber crops. In fact, what is commonly known in Massachusetts as "the potato" (*Solanum species tuberosum*) contains just a small fragment of the genetic diversity found in the five thousand potato varieties still grown in the Andes. Farmers in the Andes have even developed a frost-resistant potato that survives on the alpine tundra of the puna zone at 14,100 ft!

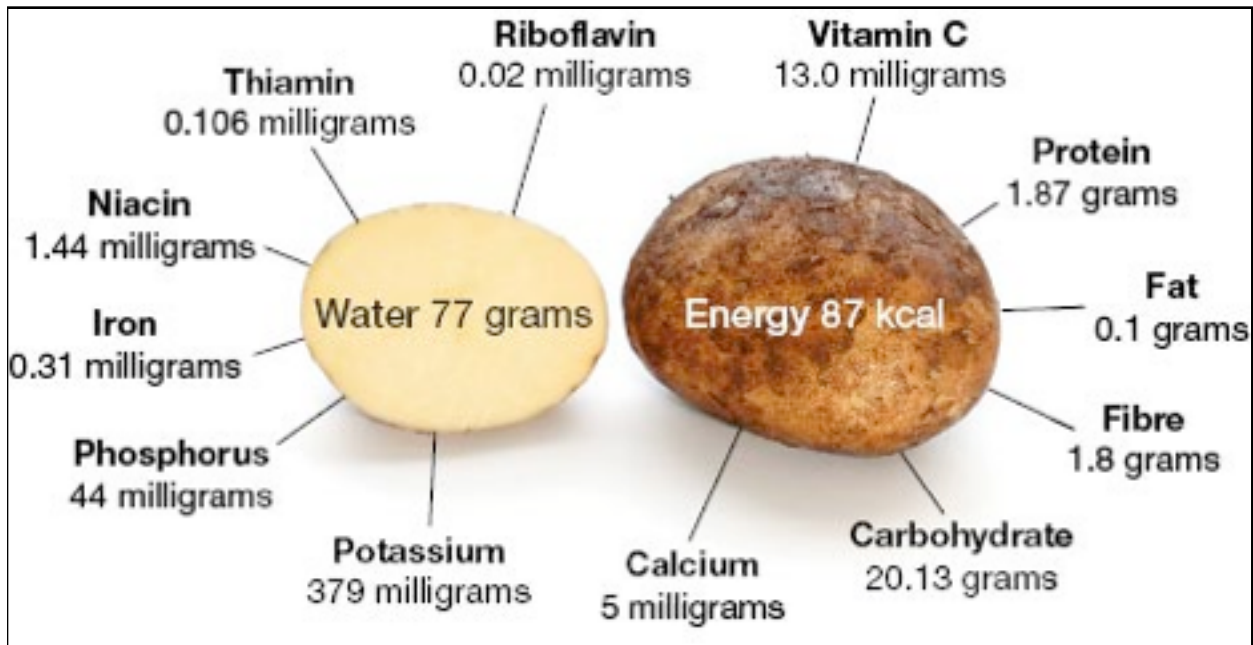
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Potatoes were so important in Andean history that time, for example, was measured by how long it took to cook a pot of potatoes, and farmers in some parts of the high Andes still measure land in *topo*, the area a family needs to grow their potato supply. This area might be larger or smaller depending on the suitability of that piece of land to grow potatoes. These farmers also classify potatoes not only by species and variety, but by the ecological niche where the tubers grow best, and it is not unusual to find four or five species cultivated on a single, small plot of land. Planting tubers remains the most important activity of the farming year near Lake Titicaca, where the potato is known as *Mama Jatha*, or “mother of growth”.

### Potato Nutrition:



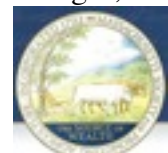
(Per 100 g, after boiling in skin and peeling before consumption)

Source: United States Department of Agriculture, National Nutrient Database

### Important Fact:

As part of the potato plant's natural defenses against fungi and insects, its leaves, stems and sprouts contain high levels of toxic compounds called glycoalkaloids. The highest concentrations of glycoalkaloids are associated with areas that are undergoing high metabolic activity, such as potato flowers, young leaves, sprouts, peels and the area around the potato 'eyes'. Small immature tubers are normally high in glycoalkaloids, as are potatoes turning green from light,

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since they are still metabolically active. Although this compound is usually found in low levels in the mature tuber, potatoes should be stored in a dark, cool place in order to keep glycoalkaloid content low. Glycoalkaloids are not destroyed by cooking, so cut away green areas and active “eyes” before cooking. Avoid planting potatoes in gardens where very small children are present, who might be tempted to eat the leaves and flowers.

*Numbers you will need to know for this activity*

Potatoes are usually planted 12” apart.

Unless you have your own data, you can use the figure of 1lb of potatoes yielded per square foot of bed. In reality this may vary greatly due to individual soil conditions, growing culture and weather. This number can be used as a simple average for the purposes of this exercise.

The amount of potato seed needed can be estimated in a 1/10 ratio. For example, if you planted one pound of seed potatoes, you could expect to yield about 10 lbs.

### **Guiding Question**

How much land would it take to grow all the potatoes our school eats in a week? A month? A year?

### **Big Idea**

Our food requires land to grow it on. Keeping land available for agriculture is important so that we can grow what we need to eat! Our school garden can grow a small amount of what we eat at our school, and farmers use a lot more land to grow the rest of our food.

### **Learning Objectives**

To use math skills to relate potato yield to land area. To gather information from the school community, and then to present findings back.

### Materials

- \* Poster board for presenting findings
- \* A pound of potatoes
- \* A long measuring tape or wheel counter.

### Preparation

Find out or have students meet with your food service director. Ask them how many potatoes they buy in a month for your school.

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## Introducing the Lesson

**Activate prior knowledge:** Review with students their potato planting project. If you measured yield, review that. Review the terms “Yield” and discuss what might affect this.

### **Engage Student Interest:**

Tell them they are going to find out how much land we would need to grow all of the potatoes the school eats.

**Procedure** (Total time approximately 1 hr 10 mins)

### In the classroom: (20 mins)

1. Give some background about potatoes in the state and around the world. Why are they such an important food crop?
2. Read the food service directors potato figures out loud. Talk about the potatoes they eat at school.
3. Bring out a pound of potatoes. These could be raw or cooked into a snack. Ask students to imagine what the number of pounds your school eats would look like!
4. Go through the math of figuring out approximate land needed for your figure. The way you do this is to translate the number of pounds your school eats in a month into square feet (as the estimate is a one to one ratio). You can then convert this figure into acres. You could also multiply this by the number of school months to find a yearly figure.

### Outside (30 mins)

1. If possible visit a football field (about an acre) or other large open space, and measure out your potato field! If you don't have a large open space, measure out your school yard and figure out how many school yards you would need to grow all of those potatoes!

### Wrap up ( 20 mins)

1. Put your findings up on poster board. You could start your poster with “did you know...?” Post these findings in the school cafeteria or garden bulletin board. Write a thank you letter to your school food purchaser and include your findings.

### **Assessing Student Knowledge**

How would we find out how much land we need for other crops?

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### **Extensions**

Write a press release to a local paper or for your school website. Visit a farm potato field if you are able, and measure out how much of their field it takes to feed your school.

### **\* MA Department of Ed. Standards in this lesson\* for grade 3**

1. *Health 3.5*: Identify the connection between food served in the home with regional food production.
2. Life Science 2. Identify structures in plants that are responsible for food production.
3. Mathematics: Geometric Measurement 5,6,7 , Measurement and Data 2,3,4
4. English Language Arts 7. Participate in shared research and writing projects.

Books and Resources Resources used for writing these guides included here.

Website for the International Year of the Potato (which was in 2008) :

<http://www.fao.org/potato-2008/en/potato/tuber.html>

The International Potato center:

<http://www.cipotato.org/>

Food Safety Watch:

<http://www.foodsafetywatch.org/factsheets/glycoalkaloids/>

Umass Amherst Extension:

[ag.umass.edu](http://ag.umass.edu)

P. O. Box 345 Seekonk, MA 02771

[www.aginclassroom.org](http://www.aginclassroom.org)

Please Visit the Massachusetts Agriculture in the Classroom Website  
to tell us how you used this resource.

Thanks!

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