



## USING SUNFLOWER SEEDS

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**Grade Level:** Grade 1

### **Agricultural Background: Sunflower History and Uses**

The scientific name for the sunflower is **Helianthus**. This name comes from the Greek for the god of the sun **Helios**, and **anthos**, their word for flower. Could there be any better name for a bright yellow flower that appears to follow the sun?



The sunflower is **native to North America**. It is thought to originate in present day Mexico and Peru. It grew wild all over the continent from the Paleo-Indian time. Today there are approximately 67 species and subspecies growing wild across North America.

Archaeologists surmise that wild sunflowers were used as a food by Native Americans going back to 8,000 years ago. The seeds were high in fat, providing an easy **energy source**. The hulls were used to make a **drink** and also for **dyes and body paint**. Dried stalks were used for **building materials** and the oil was used for **cooking, medicine and lotion**.

The use of the sunflower image as a **religious symbol** has also been documented in some native societies. The Aztecs in Southern Mexico wore crowns made of sunflowers in their temples.

The **cultivation** of sunflowers seems to have begun in present-day Arizona and New Mexico about **3000 BC**, even before corn was grown as a crop. By about 2,300 BC, the Cherokee on the East Coast of North America were also farming sunflowers.

Through **cross pollination** and **seed selection**, they encouraged plants with **larger flowers and more seeds**. The result was a stem with just one large flower that held a large number of seeds in a variety of colors including black, white, red, and black/white striped.

In the 16th century, the European explorers were introduced to the tall, brightly colored flowers. They learned how to grow them and **sent seeds back to Europe**. The plants became widespread mainly as an ornamental, but some medicinal uses were also developed.

By 1716, an English patent was granted for squeezing oil from sunflower seeds. But it was in Russia, in the 1830s, that the **manufacture of sunflower oil** was began on a **commercial scale**. Sunflowers were farmed across that country on two million acres. Government research programs were implemented. Oil contents and yields were increased significantly.

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The Russian Orthodox Church increased the popularity of the sunflower by forbidding most oil foods from being consumed during Lent. Since the sunflower was not on the prohibited list, it gained an immediate popularity as a food.

Russian and German immigrants brought sunflowers with them when they move to the U.S. and Canada in the 1900s. By 1880, seed companies were advertising the **'Mammoth Russian'** sunflower in catalogues.

In the 1930s, the Canadian government encouraged farmers to grow more sunflowers for food. By 1946, Canadian farmers had built a small crushing plant and sunflower acreage spread. In 1964, the Government of Canada licensed the Russian cultivar called **'Peredovik.'** This seed produced high yields and high oil content. Sunflower continued to be hybridized in the middle seventies providing additional yield and oil enhancement as well as disease resistance.



The first commercial use of the sunflower in the U.S. was as silage feed for poultry. It wasn't until the 1950s that the sunflower became an important agronomic crop in the U.S., starting in North Dakota and Minnesota with commercial interest in the production of sunflower oil.

By the 1970s sunflower farming spread into South Dakota and Kansas, then moving into other states including Nebraska, Texas and California. Today Europe, Russia, Argentina, China, India, Turkey and South Africa are also significant producers of sunflowers.

Sunflower production escalated in the late 1970s to over 5 million acres due to European demand for sunflower oil. During this time, animal fats as a cooking oil were discouraged due to cholesterol concerns. Russia could no longer supply the growing demand for the oil and European companies began importing whole seed from the United States, which was crushed in European mills. Today Western Europe depends on its own production and U.S. exports to Europe of sunflower oil or seed for crushing is quite small.

**Two types of sunflowers** are grown commercially in the United States today. The first is **Oilseed**. This small black seed is very high in oil content and is processed into sunflower oil and meal. It is also the seed of choice of most bird feeders. Of the two million acres of sunflowers that are grown each year in the U.S. today, up to 90 percent are the oilseed type.



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The second type is **Non-oilseed**, also known as the confectionery sunflower. This is a larger black and white striped seed used in a variety of food products from snacks to bread.

Of the seeds processed for oil, about equal thirds are dehulled, partially dehulled, or left with hulls on for processing. When hulls are removed, they become a very low value byproduct, most often burned for fuel.

After the oil is extracted from the sunflower seed, the remaining seed material (meal) is fed to livestock. The nutrient value of the meal depends on the type of processing it has gone through and the degree to which the hulls were removed prior to processing. If part or all of the hulls remained on the seed prior to oil extraction, then the meal will have higher fiber content but lower protein and fat. Regardless of the method of sunflower meal manufacture, the meal can serve as a source of supplemental protein in diets for beef or dairy cattle.



Sunflowers have enjoyed immense popularity in the United States and worldwide. This is due, to their usefulness as food and medicine, their beauty and their ease of cultivation. Sunflowers can grow easily in many types of soil as long as they have direct sunlight and a constant source of water.

**In Massachusetts**, sunflowers are grown primarily as a garden adornment and for cutting. Farmers plant a patch of sunflowers and provide them to customers at farm markets and the local flower markets. They are long-blooming and beautiful and in much demand throughout the summer and fall.

Sunflower seeds are not a commonly allergenic food and are not known to contain measurable amounts of oxalates or purines. Since sunflower seeds are high in fat, they are prone to rancidity. Store in the refrigerator in an airtight container, or store in the freezer. The cold temperature will not significantly affect the texture or flavor.

## Sunflower Uses

### Sunflowers Seeds As Food

Sunflower seeds were roasted, cracked and eaten as a snack by Native Americans. They were also fine ground into a meal that was used to thicken soups and stews. Seeds were also ground or pounded into flour for cakes, mush or bread. Roasted hulls were brewed to make a drink similar to coffee. Dye or paint could also be extracted from the hulls and petal.

Today sunflowers may be grown for their flowers or for their seeds, which are used for both human and bird food. The sunflowers that are grown for human consumption produce a large black and white seed. The seeds are sold either shelled or unshelled.

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A **sunflower kernel** is the “meat” of the sunflower seed. It has a mild nutty taste, but tender texture. It is removed from the hull mechanically. The sunflower seed is an inexpensive snack that is packed with healthy fats, protein, fiber, minerals, vitamins, antioxidants and phytochemicals.

One quarter cup (a one ounce serving) of sunflower seeds contains **160 calories**. The seeds are an excellent source of **Vitamin E, magnesium and selenium**. One serving contains 90.5 % of the daily value of Vitamin E, 31.9% of magnesium and 30.5% of selenium. They are also a very good source of **Vitamin B1, manganese, copper, phosphorus, Vitamin B5 and folate**.

Researchers at Virginia Polytechnical Institute found that sunflower kernels and pistachios had the **highest levels of phytosterols** among commonly eaten seed and nut snacks. This class of plant chemicals has been shown to **reduce cholesterol** levels and improve heart health.

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### Sunflower Oil

Sunflower oil is produced from oil type sunflower seeds. These **small black seeds** are high in oil content. This is also the type of sunflower seed that is the choice for bird food and that is ground into sunflower meal for use in animal feeds. Today sunflower oil is marketed worldwide and is second only to the soybean as an oil-seed crop.

Sunflower oil is a valued and healthy cooking oil. It is **light in color** and has a **light neutral taste** even when used for frying. It is a combination of monounsaturated and polysaturated fats with **low saturated fat levels**. It is ideal for cooking because it can withstand high temperatures. It also supplies **more Vitamin E** than any other vegetable oil.

There are three types of sunflower oil available on the market today. All are developed with standard breeding and hybridizing techniques. They differ in oleic levels and each offers a unique culinary purpose.

The three types are **linoleic, high oleic and NuSun™** sunflower oil. High oleic sunflower provides above 82 percent oleic (monounsaturated) acid. NuSun™ is a mid-range oleic sunflower oil. It needs no hydrogenation when

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cooking and has a 9 percent saturated fat level, making it extremely useful for frying. It also has a good balance of linoleic acid, an essential fatty acid that enhances its taste.

Sunflower oil is also used as **biodiesel**. This vegetable-oil based fuel is used for vehicles, including farm equipment. It burns 75 percent cleaner than petroleum based diesel and is a good lubricant, reducing wear on engine parts.

### Cut Sunflowers

The sunflower became popular as a cultivated plant in Europe in the 18th century. Over the years many new and unique cultivars were hybridized using the genetic material from the wild sunflowers that were collected in North America. Today there are even more beautiful cultivars for the garden including, **pollenless varieties that are perfect for cutting** and bringing into the house.



Traditionally, sunflower blossoms have large dark centers surrounded by brilliant yellow petals. Hybridization has produced many different colors ranging from a **lime color to intense daylight yellow, sunset red and deep maroon**. There are also varieties of sunflowers with **double petals**. Some have so many petals that the traditional dark eye is obscured.

Some varieties will grow to be fifteen feet tall, while other have been bred for their diminutive size. They will also vary from varieties with a large single head atop a sturdy stem to those that more closely resemble their wild cousins with as many as 20 flowers or more per stem.

Try one of these pollenless sunflower varieties that are well suited for cutting. **'Ring of Fire'** has bi-colored petals in dark red around a chocolate-brown center tapering off to golden yellow tips. **'Claret'** keeps its intense velvet burgundy color in the summer sun. **'Eversun'** is a deep yellow, early-blooming type with big 10-to-12-inch ray flowers around a dark brown disk. **'Teddy Bear'** has soft, fluffy, pompom heads; 2 to 3 feet tall with lots of flowers per plant. **'Giant Sungold'** is a taller version of 'Teddy Bear'. **'Mammoth'** is a classic big, tall sunflower that can reach 12 feet in height. Thick stalks on this single- stem variety supports huge heads.

### For the Birds

Studies show that most seed eating birds prefer sunflower seeds to other common seeds. They are a **high fat and protein food** that provides many of the nutrients birds need. The high oil content also provides energy for feather replacement, migration and winter survival.

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Cardinals, jays, finches, nuthatches chickadees, grosbeaks, titmice, woodpeckers and other birds with stout beaks can crack the hulls of sunflower seeds easily to reach the seed inside. Blackbirds, juncos and sparrows don't have large enough beaks to crack the shells, but search the ground for remnant seed pieces.

At the feeder, **black oil sunflower seeds are preferred** by most seed eating species. The small black seeds have a thin shell. They are easily cracked and thus preferred by chickadees, cardinals, evening grosbeaks, purple finches, mourning doves and house finches. Clean up the hulls periodically.

**Hulled sunflower seeds** and kernels are preferred by **smaller species** such as gold and house finches, and white-throated sparrows, along with grackles, cardinals and mourning doves. They produce minimal waste and require no clean up.

**Black striped sunflower seeds** are eaten by jays, grackles, cardinals, evening grosbeaks, white-throated sparrows, mourning doves, jays, chickadees, titmice, finches, juncos and woodpeckers. The gray-striped sunflower has a larger seed and heavier hull that is too tough for birds. It is used for human consumption.



If you are growing annual sunflowers for the birds, plant at two week intervals for a steady supply. Plant perennial sunflowers in a natural meadow or wild garden area where they won't crowd other plants. They blend in well with natural grasses.

### Other Sunflower Uses

While cut sunflowers are beautiful in bouquets and the seeds are a nutritious snack for humans and food for birds, this useful flower also has been used for centuries as medicines and in paints. Today they are added to some **varnishes and paints** due to their quick-drying quality.

Sunflower oil also has other uses beyond cooking. It is being added to **detergents and soaps**. It is also being tested for use in **plastics, lubricants and even pesticides**. Sunflowers are also being used as a **biofuel**.

One beneficial uses of sunflowers is in the **removal of toxic waste from the environment**. Using an emerging technology called rhizofiltration, hydroponically grown plants are grown floating over water. The extensive root systems of the sunflowers can extract large amounts of toxic metals, including uranium, from the water.

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## USING SUNFLOWERS:

### Follow-up Lesson to “Sunflower Power”

Grade Level: Grade 1

Season: Fall



#### **Lesson/Activity Description**

In this lesson, students will learn about the different uses for sunflower seed. This is a multipart activity in which students will first see and taste different sunflower products, then they will brainstorm other uses for sunflower seeds.

#### **Guiding Question**

What can we use sunflower seeds for? Can we eat them? What other uses do seeds have?

#### **Big Idea**

Seeds have other uses besides just growing the plant.

#### **Learning Objectives**

- To understand alternative uses for seeds. To relate the use of seeds to students diets.
- To understand that one seemingly simple object can have a multitude of varying uses that may be tasty and/or profitable.

#### **Caution**

It may be a good idea to cook the sunflower seeds before the lesson as working with ovens in school might be difficult.

#### **Materials**

- Sunflower plant (or picture close up picture of a sunflower)
- Small handful of cooked sunflower seeds for each student
- Small bottle of sunflower oil
- Soap or Shampoo made with sunflower oil (if you can find some)

#### **Preparation**

Gather materials. Cook sunflower seeds with recipe in resources section.

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### **Introducing the Lesson**

Talk about sunflowers. Tell students you are going to discover different ways that sunflower seeds are used.

### **Activate prior knowledge**

Show or pass around the sunflower. Encourage students to look at the seeds inside. Ask them if anyone has eaten sunflower seeds before. What are other ways the seeds can be used?

### **Engage Student Interest:**

Explain that you are going to see and try different uses for sunflower seeds. Then they will have time to draw their own unique way of using the seeds.

### **Procedure**

Total time approx. 30 mins

1. After introducing the lesson, give a bit of the history of the different uses of sunflowers throughout history.
2. Show how the seeds grow within the sunflower and remove a few, if you can.
3. Explain that one of the main uses for the seeds of sunflowers is for eating by humans and birds. Show the students the cooked sunflower seeds and invite them to try some. Talk about what they taste like. Do the students enjoy them? Why or why not?
4. Discuss the other uses for the seeds. They can be ground into oil which can be used to cook with or turned into soap. The shells can be used in fuel.
5. Think about other seeds, what other seeds have multiple different uses?
6. Challenge students to think creatively about other uses for the sunflower seeds. What would they use them for?
7. Have each student draw a picture of their idea and write a simple sentence.
8. When students have had a chance to draw and write, have them share with the group what they came up with. Discuss as a group the different ideas.

### **Wrap Up**

After hearing the students ideas about other ways to use sunflower seeds, talk about how we use seeds everyday in many different ways that we do not even realize. That is why seeds are so important, not only do they grow plants but they have many practical uses for people.

### **Assessing Student Knowledge**

As a class, or as homework, keep a log of all the seeds that you eat or use in different ways during a 24 hour period. E.g. Lunch: bread (wheat seeds turned into flour), peanut butter (seeds ground up), soap with sunflower oil, etc.

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### **Extensions**

Have the students explore other plants whose seeds have multiple purposes such as pumpkins or corn. Discuss the different ways we use those plant's seeds.

**\* Some of the Massachusetts Department of Education Standards in this lesson \***

### **Speaking and Listening 1:**

Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

### **Speaking and Listening 5:**

Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

### **Speaking and Listening 6:**

Produce complete sentences when appropriate to task and situation.

### **Books and Resources**

**Sunflower Power:** The lesson to be used before this one.

[http://aginclassroom.org/School%20Gardens/School\\_Gardening\\_Lesson\\_Plans/School\\_Gardening\\_Lesson\\_Grade%201%20Garden.htm](http://aginclassroom.org/School%20Gardens/School_Gardening_Lesson_Plans/School_Gardening_Lesson_Grade%201%20Garden.htm)

**National Sunflower Association** [www.sunflowernsa.com](http://www.sunflowernsa.com)

**Thomas Jefferson Agricultural Institute:** [www.jeffersoninstitute.org/sunflower.php](http://www.jeffersoninstitute.org/sunflower.php)

**Ohio State University:** <http://ohioline.osu.edu/agf-fact/0107.html>

**Sunflower Project - Nebraska Arboretum:** <http://schoolgardens.unl.edu/Sunflower%20Art%20Curriculum.pdf>

**Massachusetts Flower Growers' Association:** [www.massflowergrowers.com](http://www.massflowergrowers.com)

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**Massachusetts Department of Agricultural Resources:** [www.mass.gov/agr](http://www.mass.gov/agr)

**Massachusetts Association of Roadside Stands and Pick -Your Own:** [www.massfarmstands.com](http://www.massfarmstands.com)

**Alternative Agventures – Sunflowers:** [www.eisc.org/attach/sunflower.pdf](http://www.eisc.org/attach/sunflower.pdf)

**Crop Science Articles on Sunflowers:** <http://crop.scijournals.org/cgi/collection/sunflower>

**The Great Sunflower Project:** [www.greatsunflower.org/en/resources-teachers](http://www.greatsunflower.org/en/resources-teachers)

### **Roasted Sunflower Seed Recipe**

1. Roast sunflower seeds by spreading them in a layer on a baking sheet or in a shallow pan.
2. Roast in a 350 degree F. oven for ten to fifteen minutes.

(If you like your seeds salty, soak overnight before roasting. Use ¼ cup of salt for each two cups of water. Drain and dry on absorbent paper.)

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## Sunflower Photographs





