

**Year Round Growing Curriculum**

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**Harvesting Plants: Leaves**

**Author/Source:** Patrick Ryan, Alaska Botanical Garden

**Suggested Grade Levels:** 2-8th grade

**Time: 45 Minutes**

**Teaching Goal:** The purpose of this lesson is to engage youth in harvesting the vegetables and herbs they have grown over the semester. They will also be able to taste, learn about plant parts they eat, and learn about nutrients in the plants.

**Learning Objectives:** To grow, harvest, and eat leaves from the school garden.

**Core Ideas:**

* Plant Anatomy
* Plant Life Cycles
* Plant Dynamics (circulation and nutrient uptake)
* Agriculture – Harvesting
* Photosynthesis – Chemistry
* Recording Scientific Data
* Standardized Science Measurements
* Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking)

**Alaska State Science Standards: *Science:***2-LS4-1, 3-LS4-4, 4-LS1-1, 5-LS1-1, 5-LS2-1, MS-LS1-1, MS-LS1-2

**NGSS Standards:** 2-LS2-1, 2-PS1-1, 3-LS1-1, 4-LS3-1, 5-LS1-1, MS-LS1-1, MS-LS1-2, MS-LS1-6

**Materials Needed:**

***Books to Read***

“Oh Say Can You Seed?” By Bonnie Worth

“I am a Leaf” By Jean Marzollo

“First Peas to the Table” By Susan Grigsby

“Tops and Bottoms” By Janet Stevens

***Supplies***

* Plates or bowls, forks, napkins
* Salad dressing
* Crock pot
* Salt & pepper
* Salad spinner
* Scissors for harvesting
* 10+ hand lenses
* Non-Latex Gloves
* Jug with fresh water
* 2 plastic bins with fresh water for rinsing lettuce leaves and other greens

**Preparation**

* Fill watering jugs with water. Fill jug with fresh water also.
* Have bins with produce growing in room where lesson is taking place.
* Place a small amount of water in the crockpot and plug in.
* Have all of the plates, bowls, forks, salad dressing, and anything else you will be serving out and ready to serve.

**Background for Teachers:** This lesson assumes you have a gardening program in place, either indoors or out, where you have grown lettuce and greens. Otherwise, items can be purchased for the lesson.

Week prior: Make sure to have plates/bowls, forks, napkins and salad dressing available. Kale, spinach, romaine, Swiss chard and others contain the most nutrition, as opposed to iceberg lettuce. The dark, vibrant color, of spinach hints at its nutritional profile, packed with vitamin A and a great source of vitamins C and K, **iron**, and **fiber**. Spinach also contains more **folic acid** than most salad greens, which helps convert the food you eat into energy and produces healthy **red blood cells**.

***Vocabulary***

* Leaf/leaves
* Nutrients
* Observe/observation
* Harvest
* Leaf veins
* Germination
* Photosynthesis (3rd-5th grades)
* Simple vs. compound leaves (3rd-5th grades)

Optional Vocabulary:

* Margin – describing the edge of the leaves
* Venation – describing the type and arrangement of leaf veins
* Monocots – a seed that germinates and produces one leaf
* Dicots – a seed that germinates and produces two leaves

**Procedure:** (total of 45 minutes for full lesson & activity)

***Introduction*** *(5 minutes)*

Make sure all students have washed their hands before the lesson. Review what has been done over the semester (assuming there were prior lessons). Talk about changes they have observed. What was planted? How do seeds move around? What do roots do? What is thinning? Tell students that today you will take a closer look at leaves of the plants that have been growing. Ask them what they think they can investigate or observe when they go look at the plants. Generate a list on the board that includes color, shape, texture, leaf edge/margin, leaf veins/venation, size, and anything else that seems like a good idea that the students suggest.

***Hands-On Learning & Harvesting*** *(20 minutes)*

1. Split into groups. With each group, investigate the leaves of the plants they grew. What do they look like? What are their edges like? Consider having your students write their observations in their science journals, use Venn Diagrams, or make a poster that showcases their observations.
2. Using hand lenses and larger leaves, observe the different parts of the leaf. Look for difference between plant leaves and their shape or texture. **“Seed leaves”**, the first leaves to grow, will look different from the **“true leaves”**. Locate both on a plant.
3. Hold the leaf up to the light to take a closer look at the veins. Large-veined plants like Swiss Chard and Red-veined Sorrel work well.
4. Cutting leaves rather than pulling up plants when harvesting will prevent soil from sticking to plants.
5. Harvest 1-2 bins of leaves. Use plastic bins to rinse produce. Place salad greens and herbs in the salad spinner for washing.

**Younger Grades:**

***Read a Book & Cook*** *(15 minutes)*

While one leader “cooks” and serves, the other person can gather the group together for the brainstorming and learning. Information on cooking is below.

While the other person is “cooking” and serving, read a book and discuss the importance of plants. Read *Oh Say Can You Seed?* pages 24-28 about leaves and their partsor *I am a Leaf.*

**Older Students:**

**Discuss and prepare**

Teachers of older students may choose not to read a book depending on what is appropriate for their students. They may choose to discuss an aspect of plant leaves with their students instead. There are possible topics and information listed below.

Optional Discussion topics:

1. Discuss and review photosynthesis and its purpose

6CO2 + 6H2O (sunlight) à 6C6H12O6 + 6O2

2. Discuss why plants lose their leaves in the Fall?

Why do plants lose their leaves in the fall (see info below)?

3. Discuss different parts of the leaf using the poster (veins, margins, and petiole).

4. Discuss simple versus compound leaves and leaf arrangements.

Although some parts of trees like stems and buds can handle freezing temperatures, most leaves cannot. So, in order to protect themselves, trees and plants shed diseased, damaged or dead tissue (namely leaves), while simultaneously sealing the point where the leaf petiole connects to it. Known as the abscission layer, it consists of unique cells that can separate from each other based on certain physiological occurrences. As changing climate and light conditions of autumn evolve, hormones within trees change too. The most notable is auxin. It’s produced in the leaves and body of trees and plants. This balance of auxin levels between leaves and branches is the key to determining if and when leaf drop occurs.

5. Discuss the difference between **monocots** and **dicots**.

When a monocot seed germinates, it produces a single leaf (hence the prefix mono). It is usually long and narrow. Examples of monocots: corn, irises, grass. When a dicot germinates, it produces two seed leaves that look different than the shape of mature leaves. Examples of dicots: cabbage, beans, tomatoes, radishes, etc.

While the older students are discussing or the younger students are being read to, start cooking! Place BABY PAK CHOI [https://www.reneesgarden.com/collections/vegetables/**pak**-**choi**](https://www.reneesgarden.com/collections/vegetables/pak-choi)**)**  and other cooking greens in the crock pot with a small amount of water to steam (can leave a few pieces of this out to do a taste test of raw versus steamed.) Pass out plates and forks. The leafy greens should have been washed while students were investigating. Serve up salad and a small taste of steamed veggies. Use forks to serve and make sure you *wear gloves* while cooking, washing and serving the produce.

**Ending Activity**

Discuss how everything tastes. Encourage adjectives and other descriptive words.

Extensions:

Read another book – First Peas to the Table, Tops and Bottoms, or What’s in the Garden*.*

 “Garden Song” by David Mallette (lyrics below).

Ask students to write a descriptive paragraph about their salads

Ask students to draw their salad

Science journaling while doing their investigation

***Garden Song* by David Mallet**

**CHORUS** Inch by inch, row by row, I'm gonna make this garden grow

All it takes is a rake and a hoe and a piece of fertile ground

Inch by inch, row by row, someone bless these seeds I sow

Someone warm them from below 'til the rain comes tumbling down

**VERSE 1** Pullin' weeds and pickin' stones, we are made of dreams and bones

I feel the need to grow my own 'cause the time is close at hand

Grain for grain, sun and rain, I'll find my way in nature's chain

I tune my body and my brain to the music of the land

**REPEAT CHORUS**

**VERSE 2** So plant your rows straight and long, temper them with prayer and song

Mother Earth can make you strong if you give her love and care

An old crow watching hungrily from his perch in yonder tree

In my garden I'm as free as that feathered thief up there

**REPEAT CHORUS**

**Assessment:**

If students journaled their observations in their science journal you can grade for inclusion of all suggested observations.

You can also consider assessing whether or not they participated.

You can easily extend this activity into reading or writing and assess based on those activities.

**References:**

**Books:**

*The Budding Botanist (AIMS Activities Grades 3-6) Investigations with Plants*

by Evalyn Hoover, Howard Larimer, Sheryl Mercier, Michael Walsh, Dave Youngs and Beverly Tillman 2009 ISBN: 1-881431-40-1

*The Classroom Hydroponic Plant Factory*

by Foothills Hydroponics, inc. 2010 ISBN: 0-9669557-1-4

*From Seed to Plant*

by Gail Gibbons ISBN: 0-8234-1025-0 1991

*Plant Plumbing: A Book About Roots and Stems* (Growing Things)

by Susan Blackaby 2003 ISBN: 1-4048-0109-X; ISBN: 978-1-4048-0385-5

*Tops & Bottoms*

by Janet Stevens ISBN: 0-15-292851-0

*What’s In The Garden?*

By Marianne Berkes ISBN 978-1-58469-190-7

**Websites**

*Illinois ACES College of Agricultural, Consumer and Environmental Sciences* <http://www.aces.uiuc.edu/vista/html_pubs/hydro/require.html>

*Gardening Know How* <https://www.gardeningknowhow.com/special/children/how-plants-grow.htm>

*Simply Hydroponics and Organics*:[*http://www.simplyhydro.com/system.htm*](http://www.simplyhydro.com/system.htm)