

# Weeds Winning Ways

## Overview

Students will learn to identify a common plant that is generally regarded as a “weed,” and will use it as a pattern to determine what adaptations have made it and other weeds successful. Anyone who plants a garden or maintains a lawn deals with dandelions and a host of other weeds. Some people appreciate their beauty and tenacity, others really dislike them. In any case, dandelions are good plants to study because they are found almost everywhere, grow quickly and demonstrate the adaptations that make weeds successful plants in many environments.

## Background

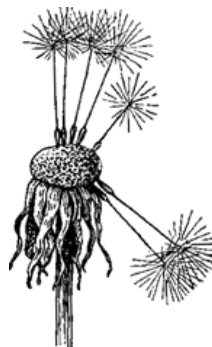
This is a study best done in early fall or spring when dandelions will be actively growing and blooming around the school. If they are not blooming dandelions can be difficult to spot. Dandelions are native to Europe and Asia and arrived with the European immigrants as part of their gardens—used for salads and medicine. Once established dandelions quickly found their way across North America and are now growing in almost every region—yes even in Alaska and Hawaii. They are now considered weeds because most people have little use for them or even consider them to be problems. Dandelions suffer the pain of being too successful. Weeds grow fast and usually establish quickly in open soil or broken ground.

You likely recognize the plant and its long leaves with tooth-shaped edges that look like lion's teeth—that's where they got the name. Note also that the leaves fan out low to the ground from a center point and cover a lot of ground around the stem—blocking sunlight and keeping other plants from competing for water or nutrients. With this low growth form dandelions can out compete grasses and do even better when the lawn is mowed. Weeds protect the ground around their main stem.

Actually, there are two different kinds of dandelions and both may be found in Minnesota. Careful inspection of the leaves may enable you to tell the difference, but the easiest way to tell them apart is by the seeds at the bottom of the little parachutes. One species has green seeds (*Taraxacum officinale*)—the original dandelion used for medicinal purposes; and one has red seeds (*Taraxacum erithrosperrum*) - erithro = red, sperrum = seed. Either kind makes a good plant to study and you may be lucky to have both species in your schoolyard. In any case you can have students observe closely to see if both kinds are present.

The yellow dandelion flower is really somewhat like a bride's bouquet of small flowers. It's a cluster or flower head of many tiny flowers, called florets. This family of flowers is known as composites. Tear a flower head apart and use a magnifier to find one of the small flowers, it will look like the drawing at right.

Each of these small flowers can and likely will produce a “parachute” looking seed that floats away under a fluffy top. This explains why a single puffy seed head



## Time:

Day 1: 60 minutes

Day 2: 60 minutes

Day 3: variable

Day 4: variable

## Skills:

Comparing

Explaining

Measuring

Observing

## Vocabulary:

adaptation

taproot

weed

## Materials Needed:

- Garden trowel
- Magnifiers
- Pencils/colored pencils
- Popsicle sticks / markers
- Rulers
- Science Notebooks / Journals
- *Minnesota Weatherguide Environment™ Calendar*

has from 75 to 180 seeds or more. Some students may want to try and count how many seeds there are on a seed head. Weeds produce lots of seeds, often many times during the year.

One other characteristic of the dandelion that makes it so successful is its long tap root that is difficult to pull, but can be dug out of the ground. You may want to challenge your students to see if they can get a dandelion taproot. Weeds develop root systems that protect their growth—often these are taproots.

## The Activity

### Day 1

Tell your students, “Today, we are going lion hunting! It is a scientific expedition and you will need a sharp pair of eyes, a sharp pencil and your journals. As scientists we are all collecting data and looking for answers to questions.”

Take students out into the schoolyard and have them search for “lions with golden manes”—blooming dandelions. If it is not real early in the day, there will likely be enough plants blooming so that each child or pair of children can work with one plant. Chose an area that is not likely to be mowed in the next few days.

#### Leaves

Ask them to closely observe the leaves with questions like: How many leaves are on the plant? How are the leaves arranged? How long are the leaves? Do the leaves grow up like grass or flat on the ground? Are any other plants growing under or next to the dandelion? Then, ask them to draw the leaves in their journals.

#### Flowers and Seeds

Next they should observe and draw a picture of the flower head and a single floret. Show students how to take a flower head apart so they can see a single floret. You may ask them to measure the flower head and height of the flower stalk. Are flowers different on the outside of the flower head?

If there are seed heads to be observed, ask students to draw a single seed. If available, students could also use digital cameras/phones to make records of their observations.

Students may collect parts of the dandelion to draw when back in the classroom or to dry and keep in their journal.

Ask them to write notes in their science notebooks/journals about:

Observations about the locations where dandelions are growing.

Any ideas that they have about why there are so many dandelions.

Any “I wonder” questions that they have about dandelions.

### Day 2

Back in the classroom have students share their drawings and discuss their observations from yesterday about locations and the quantity of dandelions.

Ask if they have ideas about why dandelions are so successful.

They will likely suggest: large number of seeds that can blow to new locations, fast growth.

Next ask them to share their “I wonder” questions and list them on a whiteboard.

Among other things, students may wonder: How long does it take for a flower to form seeds? How many seeds are in a seed head? How long does it take for a flower bud to bloom? How long does it take for flowers to turn into seeds? How far can seeds travel? How tall do flower stalks get? How fast do flower stalks grow? What type of root do they have? How long are their roots?

Once you have input from all the students ask them to chose an “I wonder” question from the list that they would like to investigate. Students can work as individuals or in small groups. In any case, they should write the question in their journal, and then the steps (procedures) they would take to find an answer to that question. They should be sure to list the materials they will need.

### Day 3

Take students back to the schoolyard and allow them enough time to initiate and/or carry out their investigations.



## Day 4 and beyond

Once the investigations are complete, ask each student or group of students to write up their results and conclusions then make a presentation to the class.

### Questions for Discussion

- What other weeds can be found in the schoolyard? What characteristics do they share with dandelions? Plantain is probably a common weed in most schoolyards. It too has a basal rosette of leaves and produces many seeds. White clover may be common. Easily identified, it has composite flowers and reproduces by sprouts from the roots as well as seeds.
- Can dandelions be useful for humans? Actually, dandelions were brought here to be used as food and medicine and can be found in some markets in early spring.

### Extensions

- Engineer a device that mimics the structures and functions of plants in seed dispersal, including the wind-catching design used by dandelions. (2nd grade standard, LS2/ETS1)
- Collect all stages of the dandelion blossom and arrange them in order.
- What is the average length of a flower stalk? How does that compare with the average length when it has turned to seed?
- Have students dig out dandelions and measure their taproots. This will require a trowel or other digging tool.
- Students could do a census of dandelions to find out how many plants there are in one area. Or they could sample different places on the schoolyard and: compare how many dandelions occur in equal sized areas; try to find places where dandelions do not grow; find places where the dandelions grow really tall.
- Do dandelions grow taller where the schoolyard is mowed or unmowed?
- Examine dandelions on the schoolyard before and after mowing to see what characteristics make them successful weeds.
- What insects can be found on dandelion flowers?

### Resources

*Minnesota Weatherguide Environment™ Calendar*

online: <https://jeffersfoundation.org/programs/calendar-in-the-classroom/>

*Dandelions* by Robin Nelson

*A Dandelion's Life* (Nature Upclose) by John Himmelman

*The Dandelion Seed* by Joseph P. Anthony and Cris Arbo (Paperback)

*Dandelions: Stars in the Grass* by Mia Posada

*The Teeth of the Lion: The story of the beloved and despised dandelion* by Anita Sanchez

*Weeds: Friend or Foe* by Sally Roth

### Minnesota State Academic Standards

#### 3-D Science Standards

##### Science Practices:

1. Asking Questions
3. Plan and Carry out Investigations (investigating through observation)
4. Analyzing and Interpreting Data
5. Use Mathematics and Computational Thinking
8. Obtaining, Evaluating and Communicating Information

**Crosscutting Concepts:**

1. Patterns
4. Systems and System Models
6. Structure and Function

**Disciplinary Core Ideas:**

LS1: From molecules to organisms: Structures and processes

3rd Grade: Plants have internal and external structures that function to support survival, growth, and reproduction

3rd Grade: Develop drawings/models of changes organisms go through during their life

5th Grade: Obtain evidence of growth patterns for plants grown in different environments

LS2: Ecosystems: Interactions, energy, and dynamics

3rd Grade: Determine how amounts of sunlight and water impact the growth of a plant

LS3: Heredity: Inheritance and variation of traits

4th Grade: Plants have traits inherited from parents and that variation of these traits exists in a group of similar organisms

LS4: Biological evolution: Unity and diversity

2nd Grade: Organisms' characteristics determine how well they survive in different Minnesota habitats including wetlands, prairies, gardens, etc.

**Integration of 2 Core Ideas within Extensions:**

LS2: Ecosystems: Interactions, energy, and dynamics; ETS1: Engineering Design

(2nd Grade) Engineer a device that mimics the structures and functions of plants or animals in seed dispersal, including the wind-catching design used by dandelions

**ELA Standards and Benchmarks** (Next page)

## ELA Standards and Benchmarks

Grade	Benchmark with Anchor Standard/Code
2	<p>Write routinely, including illustration, for a range of tasks, purposes and audiences. (W2: 2.2.2.1)</p> <p>Write to inform or explain, using details to show understanding of the topic and including an introductory and concluding statement. (W5: 2.2.5.1)</p> <p>Create written, oral and digital content that communicates knowledge and ideas, including relevant facts and descriptive details, in a variety of presentation styles. (LSVEI 3: 2.3.3.1)</p>
3	<p>Write routinely for a range of tasks, purposes and audiences. (W2: 3.2.2.1)</p> <p>Write to inform or explain, selecting and organizing relevant details to show understanding of the topic, building on skills from previous years. (W5: 3.2.5.1)</p> <p>Ask and answer questions to check understanding of content and viewpoints, as well as for clarification, in a discussion. (LSVEI 1: 3.3.1.2)</p> <p>Create written, oral and digital content that communicates knowledge and ideas, including relevant facts and descriptive details, in a variety of presentation styles. (LSVEI 3: 3.3.3.1)</p>
4	<p>Write routinely for a range of tasks, purposes and audiences. (W2: 4.2.2.1)</p> <p>Use vocabulary, language, structure and features of spoken language to convey ideas precisely in communicating with others in social and academic situations. (LSVEI 2: 4.3.2.1)</p> <p>Create written, oral and digital content that communicates knowledge and ideas in an organized manner, including relevant and credible facts and descriptive details to support central ideas or themes, in a variety of presentation styles. (LSVEI 3: 4.3.3.1)</p>
5	<p>Write routinely for a range of tasks, purposes and audiences. (W2: 5.2.2.1)</p> <p>Write to inform or explain, using precise, domain-specific vocabulary, developing subtopics, and grouping related information logically in chosen text structure, including using formatting and visuals when useful to aid comprehension, building on skills from previous years. (W5: 5.2.5.1)</p> <p>Use vocabulary, language, structure and features of spoken language to communicate ideas precisely, recognizing situational differences. (LSVEI 2: 5.3.2.1)</p>