Table Rocks Curriculum

Amazing Weed Parts

Objective: Students will play a memory/matching game to become familiar with the basic parts of a plant and will explain the functions of each. Students will then identify ***noxious weeds*** and describe how specialized adaptations enable certain ***noxious weeds*** to grow, spread, and outcompete ***native*** vegetation.

Benchmarks Targeted: 1 and 2(Grades 1-5)
Oregon Standards Achieved:

Subject Area: Life Science

Common Curriculum Goals: Organisms: Understand the characteristics, structure, and functions of an organism.

Benchmark 1: Recognize characteristics that are similar and different between organisms. Describe the basic needs of living things.

Benchmark 2: Group or classify organisms based on a variety of characteristics.

Common Curriculum Goals: Diversity/Interdependence: Understand the relationships among living things and between living things and their environments.

Benchmark 1: Describe a habitat and the organisms that live there.

Benchmark 2: Describe the relationship between characteristics of specific habitats and the organisms that live there.

Subject Area: Social Science

Common Curriculum Goals: Geography: Understand how people and the environment are interrelated.

Benchmark 1: Understand how peoples' lives are affected by the physical environment

Benchmark 2: Understand how physical environments are affected by human activities.

Subject Area: Social Science Analysis

Common Curriculum Goals: Identify and analyze an issue.

Benchmark 1: Identify how people or other living things might be affected by an event, issue, or problem.

Benchmark 2: Identify characteristics of an event, issue, or problem, suggesting possible causes and results.

Subject Area: English/Language Arts

Common Curriculum Goals: (All Grades) Write narrative, expository, and persuasive texts, using a variety of written forms including journals, essays, short stories, poems, research reports, research papers, business, and technical writing to express ideas appropriate to audience and purpose across the subject areas.

Common Curriculum Goals: (All Grades) Demonstrate knowledge of spelling, grammar, punctuation, capitalization, and penmanship across the subject areas.

Length of Lesson: 45 minutes

Materials:

- ✓ "Plant Part Memory Game" cards (provided; 1 set per 2-3 students)
- ✓ Cuttings from ***noxious weeds*** that grow in the school yard or other local area (see the "Most Wanted Weed" cards from the "Champion Weed Seeds" lesson for reference)

- ✓ 2 large clear plastic cups, one filled with grass clippings and the other with dandelions
- ✓ "Parts of a Plant" activity sheet (included at the end of the Botany chapter)
- ✓ Pictures of wildflowers from the Table Rocks website: http://www.blm.gov/or/resources/recreation/tablerock/table-rock-plants.php

Key Vocabulary: *fruit, habitat, invasive, native, noxious weed, root, seed, stem, weed*

Background:

The term ***weed*** refers to any plant growing in a place it is not wanted. A plant may be designated a ***noxious weed*** by a state when that plant causes significant economic or ecological damage. Oregon has over 1.3 million acres where ***noxious weeds*** are present (an area more than 6 times larger than New York City)! ***Noxious weeds*** cause huge problems on both private and public lands. These plants invade crop and grazing lands, where they replace edible vegetation with potentially toxic forage. They threaten wetlands and other ***habitats*** by crowding out ***native*** plants that wildlife depend on for food and shelter. In addition, ***noxious weeds*** can increase the risk of wildland fire and can lead to property damage or personal injury when encountered in recreation areas.

Noxious weeds are not ***native*** to the ecosystems they invade. Many were brought here from overseas, accidentally in the ballasts of ships or in feed for animals. Some were brought intentionally for agricultural, medicinal, or ornamental purposes. These plants are successful invaders because they lack natural population controls. In its ***native*** ecosystem, each plant has natural predators and parasites that are specially adapted to utilize it. It lives in balance with these organisms, which serve to keep its population in check. When we bring a plant species to a new ***habitat***, as in the case of ***noxious weeds***, we free it from these natural controls. In their absence, the imported species is able to outcompete ***native*** plants for resources (water, sunlight, nutrients).

Another characteristic common to most ***noxious weeds*** is that they are well-adapted to invade areas after an environmental disturbance such as a wildfire or clearing for development. By growing and spreading rapidly, reproducing early and copiously, and dispersing their ***seeds*** efficiently, these ***weeds*** are able to colonize and take over disturbed sites before other plants have a chance to establish. Often, human disruptions of ***native*** ecosystems give ***weeds*** the opportunity to invade. Most ***native*** plants take much longer to regenerate after a disturbance, and may not be able to do so at all if ***weeds*** have become established. Following are some adaptations that can enable ***noxious weeds*** to outcompete ***native*** plants:

- Capacity to produce thousands, if not millions, of ***seeds*** per plant.
- ***Seeds*** that germinate in a variety of temperature and moisture conditions or that can remain dormant in the soil until conditions are right.
- Ability to regenerate from very small pieces of ***roots*** or ***stems***.
- Deep ***root*** systems that can reach water stores during times of drought.
- Annual (as opposed to perennial) life cycles. ***Invasive*** grasses, for example, germinate in the winter or early spring, use as much water as they can while it is available (leaving little moisture for the ***native*** perennial grasses which need it to persist through the summer), set ***seed*** early, and then die. These annual grasses withstand the dry season as ***seeds*** before germinating again with the following winter's rains.

There is still hope for our ***native*** plants! Many private landowners and public land managers are working together to identify and eradicate ***noxious weed*** populations. You can help too! By being able to recognize ***noxious weeds*** that grow in our area, you can report infestations when you see

them. Additionally, you can tell other people about the problems ***noxious weeds*** cause and can make sure you are not spreading them via your clothes, camping gear, animals, or going off designated trails.

Procedure:

Preparation:
To help students understand the concept of a ***weed***, begin with a demonstration. Show your class the two plastic cups: one filled with grass clippings, the other with dandelions. Hold up the cup with grass clippings and ask students to raise their hands if they think grass is a ***weed***. Repeat with the cup holding the dandelions. Most students will identify the dandelion as a ***weed***. Ask these students to give reasons why they think the dandelion is a ***weed***. Now tell the class this grass was found growing in a flower bed. Ask the students to raise their hands if they would consider the grass in this situation to be a ***weed***. Explain that a plant is called a ***weed***" when it grows in a place it is not wanted.

Activity:
Explain to students that some ***weeds***, called ***noxious*** or ***invasive weeds***, are very aggressive and can take over an area if they begin to grow there. How are they able to do this? Most ***noxious weeds*** have been brought here from overseas and the species that eat them and parasites that keep them in check in their ***native*** lands have been left behind. Also, many ***noxious weeds*** have outstanding or amazing plant parts that are specially adapted to grow and spread very rapidly or to make it difficult for other plants to grow. Tell students that they are going to play a memory/matching game to learn the basic parts of a plant. After that, they will discover some of the amazing features of ***weeds*** that (unfortunately for our ***native*** plants) enable these invaders to thrive here in the Rogue Valley and in other areas beyond their ***native*** lands.

Plant Parts Memory game:
Card Set #1: In this round of the game, students will learn the basic parts of a plant by associating them with common food items. Disperse the "Parts of a Plant" activity sheet and allow students to familiarize themselves with the different parts. Divide the class into groups of 2-3 students. Give each group a copy of Card Set #1 (12 cards total; 6 ***fruit***/vegetable and 6 plant part). Have students carefully look at all the pictures, then place the cards face down on the table or desk and mix them up. The game is then played like Memory©. Students turn over two cards on their turn. If the cards match, the student keeps that pair and gets another turn. If the cards do not match, the student returns them to their upside down position and it is the next student's turn. In this version of the game, students will not be looking for exact matches but for a pair that consists of a ***fruit***/vegetable and its corresponding plant part.
Answer key: Carrot/***Root***, Asparagus/***Stem***, Broccoli/Flower, Tomato/***Fruit***, Spinach/Leaf, Peas/***Seed***. You may want to introduce these pairings before playing the game.

After playing the game with Card Set #1, discuss with the students what they learned: they are already familiar with the basic parts of a plant from some of the foods they eat. You may also want to discuss the functions of the different plant parts (see Botany Chapter Introduction).

Grades 3-5: Card Set #2: In this round, students will learn how certain ***weeds*** have specially adapted plant parts that allow them to grow, reproduce, and spread very efficiently. Before playing the game, discuss ***weeds*** and their adaptations with students. You can use the "Most Wanted Weed" cards from the "Champion Weed Seeds" lesson to show the students pictures of the following plants:

- ***Root***- Canada thistle can regenerate from a ***root*** piece as small as ¼ inch. Russian knapweed has a taproot (main ***root***) that can grow up to 20 feet deep.
- ***Stem***- Medusahead ***stems*** create a thick layer on the ground when they die that other plants cannot grow through. Blackberry ***stems*** can sprout ***roots*** wherever they contact the ground.
- **Leaf**- English ivy leaves form a dense cover along the ground or on tree branches that blocks the sunlight other plants (including the trees) need to grow.
- **Flower**- Puncture vine can flower within 2 weeks of sprouting. Purple loosestrife was brought here and planted in gardens for its beautiful purple flowers.
- ***Fruit***- Leafy spurge capsules (***fruits***) burst open when they ripen and can shoot ***seeds*** up to 15 feet away from the parent plant. Puncture vine can produce up to 400 ***fruits*** per plant, each with many spines that enable it to attach to humans and animals for transport.
- ***Seed***- Purple loosestrife can produce up to 2.5 million ***seeds*** per plant. Canada thistle ***seeds*** can survive in the soil for up to 20 years. Yellow starthistle can produce as many as 100,000 ***seeds*** per plant, and these ***seeds*** can survive in the soil for up to10 years. This plant also produces two types of ***seeds*** – one carried by wind and one that drops to the ground.

Next, use Card Set #2 to play a second round of the memory game. In this round, students will attempt to match pairs consisting of 1) a card with the name of a ***weed*** and a description of its amazingly adapted plant part, and 2) a card with the name and picture of the ***weed***. The object is for students to gain familiarity with some of the more common and problematic ***weeds*** in our region, and to learn how these ***weeds*** are able to spread so aggressively. In order to enhance retention of the material during this round, you may wish to have students read aloud the information on the cards with each turn they take.

Scientific Inquiry:
Grades 3-5: Conduct an experiment to determine the comparative effectiveness of various ***weed*** eradication methods. Identify an area containing populations of ***noxious weeds*** on your school grounds. Have students mark off a square area around the ***weeds*** with flagging tape or brightly colored rope. Divide this area into four equal sections. In section one, do no treatment. This section will serve as the control. In section two, do only manual removal. After students have pulled weeds, put all plants in a plastic bag before disposing of them in the trash. In section three, do manual removal and then seed the section with ***native*** plant seeds. In section four, leave the ***weeds*** standing, but remove their flowers, flower heads, or seed heads, and seed with ***native*** plants. Take care to place seed heads in a bag before disposal and don't let any seeds fall out! Have students formulate a hypothesis and keep a journal of their observations throughout the experiment. Observations might be made on a weekly basis over the course of 1-3 months. Measurements might include number of ***weed*** plants, number of ***native*** plants, height of plants, number of branches per plant, and number of flowers or flower heads per plant. Once the investigation is complete and the results are sufficient to form conclusions, students can summarize their findings in a report. Data, in the form of graphs and tables, and conclusions from these reports could be presented at the Bear Creek Watershed Education Partners (BCWEP) Symposium held each spring.

Follow-up:
Grades 3-5: Have students sit in a circle on the floor or at their desks. Pass around one of the ***noxious weed*** specimens, giving each student a chance to observe it closely. Ask each student to say one word that describes the plant and write these adjectives on the board. After everyone in the class has contributed, tell students the name of the ***weed*** and one or two interesting facts about the plant (refer to the "Champion Weed Seeds" lesson "Most Wanted Weed" cards for information).

Repeat with as many ***weed*** specimens as time and attention spans permit. Later, students can write a short story or poem about a ***noxious weed*** using as many of the adjectives on the board as possible.

Extensions:

- After your Table Rock hike, ask the students to name all of the wildflowers they remember seeing (you can use pictures from the Table Rocks website as a reminder). Ask them if they saw any ***noxious weeds*** on their hike. List these plant names in two columns on the board (***native*** and ***invasive***). Based on their knowledge of these and other ***noxious weeds***, do they think the ***native*** wildflowers of Table Rocks are in danger of losing their ***habitat***? Have them draw a picture to illustrate what the Table Rocks might look like if they were completely invaded by ***noxious weeds***, or if all the existing ***noxious weeds*** were removed and more ***habitat*** was created for the ***native*** plants to grow.

- Use the "Table Rocks Wildflower Coloring Book" included in this curriculum binder to reinforce understanding of plant parts and to practice identifying some of Table Rocks plants. Then, access the "Celebrating Wildflowers Northwest Coloring Book" at http://ww.nps.gov/plants/color/northwest/, and download pictures of some of the ***noxious weeds*** present at the Table Rocks to color as well. (Table Rocks ***noxious weeds*** included on the site are: yellow starthistle, St. John's wort, and Canada thistle.) This exercise should help students distinguish between native flowers and ***noxious weeds*** at the Table Rocks.

- **Grades 3-5:** After completing the ***weed*** identification in the classroom, go for a walk in your school yard and see how many ***noxious weeds*** the students can find. Alternatively, design a scavenger hunt specific to the ***weeds*** around your school and divide students into teams of 2-3 to participate. Award small prizes to the teams who can find all of the ***weeds*** from the hints given.

  Sample scavenger hunt clues:
  - *I have yellow flowers with large spikes and can cause "chewing disease" in horses* (Yellow starthistle)
  - *I am also known as goathead and have sharp spines on my **seed** capsules that can stick in your foot or bike tire* **(**puncture vine)
  - *I have bright yellow flowers and tiny green leaves that grow on a skinny green **stem*** (Scotch broom)

- **Grades 3-5:** Have students complete the "Weeding out the Words" crossword provided in the curriculum binder.

Discussion Questions:

What are the basic parts of a plant, and what is the function of each?
Root, ***stem***, *leaf, flower,* ***fruit***, *and* ***seed*** *(see "Parts of a Plant" activity sheet and "Basic Parts of a Plant" section in the Botany Chapter Introduction for their functions).*

What is a *weed*? Are all *weeds* considered *noxious*?
Generally, the term ***weed*** *is used to describe any plant that is growing somewhere it is not wanted. Not all* ***weeds*** *are* ***invasive*** *or* ***noxious****. An* ***invasive weed*** *can grow or spread very rapidly and infest large areas. "****Noxious weed****" is an official designation for* ***invasive weeds*** *that cause*

*significant ecological or economic damage. Many **noxious weeds** damage wildlife **habitat** or farmland as they use water and nutrients that **native** plants and crops need to grow.*

Why are *noxious weeds* able to invade *native* plant *habitat*?
***Noxious weeds** have amazing plant parts! Many of these **weeds** produce millions of **seeds** per plant, have **seeds** that can live in the soil for many years, or can grow new plants from very small pieces of the **stem** or **root**. Also, many of these **weeds** were brought here from foreign ecosystems. In their new home, they are free from the predators and diseases that are specially adapted to exploit them and which naturally control them in their **native** lands. Lastly, most **noxious weeds** have patterns of growth, reproduction, and dispersal that enable them to exploit disturbances in the environment. Disruptions to **native** ecosystems create opportunities for **weeds** to invade.*

Give some examples of *noxious weeds* that grow on the Table Rocks.
*Some examples include Medusa head**,** hedgehog dogtail (both are nonnative annual grasses that choke out the **native** bunch grasses), blackberry, and yellow starthistle.*

References:

Alien Invasion: Plants On The Move. Theresa Grimm. 2007. Sonata, Inc. 3 December 2006 <http://weedinvasion.org>.

Donaldson, Susan. "Weedbusters: A Nevada Noxious Weed Activity Book." University of Nevada Cooperative Extension. Fall, 2000. University of Nevada Cooperative Extension. 8 August 2006 <http://www.unce.unr.edu/publications/files/nr/2000/SP0016.pdf>.

PLANTS Database 2007 NRCS USDA 3 December 2007 <http://plants.usda.gov>.

Table Rocks Environmental Education. 2007. USDI BLM. 16 October 2007 <http://www.blm.gov/or/resources/recreation/tablerock/index.php>.

Thunhorst, Gwendolyn, and Jil Swearingen. "Canada Thistle." Plant Conservation Alliance's Alien Plant Working Group. 2006 USDI NPS. 10 December 2007 <http://www.nps.gov/plants/ALIEN/fact/ciar1.htm>.

Urban, Karl. "Celebrating Wildflowers Northwest Coloring Book." Plant Conservation Alliance. Bureau of Land Management 3 December 2007 <http://www.nps.gov/plants/color/northwest/>.

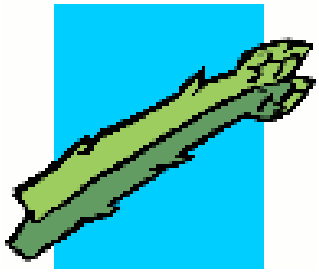
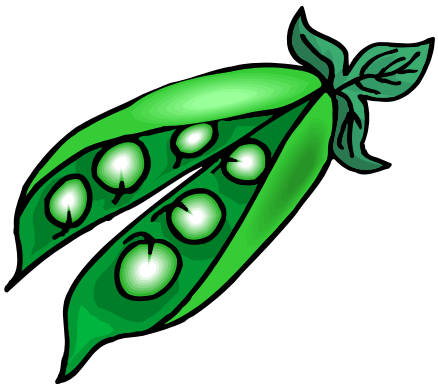
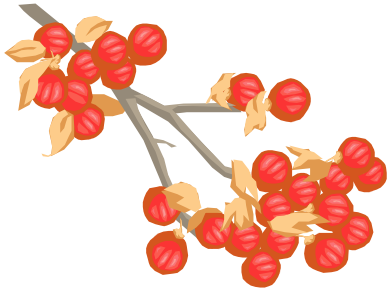
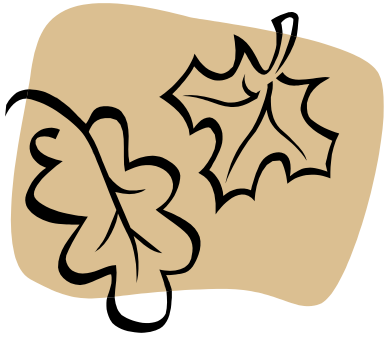
Carrot 	**Asparagus** 
Broccoli 	**Tomato** 
Spinach 	**Peas** 

Table Rocks Plant Parts Memory Matching, Set #1 (cont'd)

Root 	**Stem** 
Flower 	**Fruit** 
Leaf 	**Seed** 

Root

©2001 CDFA

M.Harte, forestryimages.org

Canada thistle

Stem

R. Old, XID Services, Inc., forestryimages.org

R. Old, XID Services, Inc., forestryimages.org

Joseph O'brien, USDA, Forest service, bugwood.org

Himalayan blackberry

Flower

Purple loosestrife

Fruit

G.D. Carr

F.& K. Starr, USGS forestryimages.org

Puncture Vine

Leaf

R. Old, XID Services, Inc., forestryimages.org

C.Bargeron, University of Georgia, forestryimages.org

English ivy

Seed

J.K. Clark

Yellow starthistle

Root

Canada thistle has a taproot (main root) that can send out lateral roots as deep as 3 feet below ground from which shoots sprout up at frequent intervals. Readily regenerates from root fragments less than one inch in length.

Stem

Himalayan blackberry stems can sprout roots wherever they contact the ground, allowing this plant to spread everywhere!

Flower

Purple loosestrife was brought here and planted in gardens for its beautiful purple flowers. Unfortunately, it takes over wetland areas, crowding out native plants and clogging waterways.

Fruit

Puncture vine can produce up to 400 fruits per plant, each with many spines that enable it to attach to humans and animals for transport.

Leaf

English ivy leaves form a dense cover along the ground or on tree branches that blocks the sunlight that other plants (including the trees) need to grow

Seed

Yellow starthistle can produce as many as 100,000 seeds per plant. These seeds can survive in the soil for up to 10 years.