LESSON 15

The Key to Montana Weed I.D.

Grade level: 4-8
Subject Areas: Biology
Duration: 30 minutes
Setting: Classroom
Season: Any
Conceptual Framework Topics: Species, classification, identification, tools and technology, invasive plants in Montana

OBJECTIVES

Student will understand what a dichotomous key is and how to use one. They will learn to identify distinguishing characteristics that separate one plant species from another. They will be able to identify up to 6 of Montana's noxious weeds using a simple key.

METHOD

Students use a very simple key to "identify" different types of candy. They then use a more sophisticated but easy-to-use key to identify noxious weeds of Montana.

MATERIALS

Examples of the following weed species. You can use the photos at the end of this lesson, plastic specimens, plants you have pulled or dug up, or dried specimens:

- Canada thistle *(Cirsium arvense)*
- spotted knapweed *(Centaurea stoebe)*
- Dalmatian toadflax *(Linaria dalmatica)*
- houndstongue *(Cynoglossum officinale)*
- leafy spurge *(Euphorbia esula)*
- field bindweed *(Convolvulus arvensis)*
- The **Dichotomous Key to Noxious Weeds of Montana worksheet**
- The **"Candy Key" worksheet** (used with permission from the *Alien Invasion* Weed Curriculum)
- Five different kinds of candies: chocolate "kisses," Jolly Ranchers, lollipops, Smarties or SweeTARTS, and Starbursts, mixed together in a bowl.

BACKGROUND

Botanists, naturalists, resource managers, and others interested in recognizing plants and animals often use **dichotomous keys** to correctly identify species. *Dichotomous* means "divided into two parts." In a dichotomous key, the user is given a series of choices between two statements about characteristics of the organism. Each choice leads to another pair of statements until the name of the organism is reached.

Using a key to identify plants helps students practice observation skills and learn how to use similarities and differences to distinguish between species. Close observation allows students to see the variation in plant characteristics, and actively engaging them in identification of weeds will facilitate retention of knowledge about the invasive species in their area.

Teacher's Key to Dichotomous Key

F spotted knapweed

B Canada thistle

E Dalmatian toadflax

C houndstongue

A leafy spurge

D field bindweed

PROCEDURE

Ahead of time: Read through the lesson and collect the necessary materials. Label any plant specimens or models you collect with capital letters so that your students can use those to identify each specimen by name (see **Weed Key** worksheet). Practice using the keys so that you are familiar with them.

1. Begin the lesson by asking students what kinds of clues they use to distinguish one classmate from another. They may mention hair color, size, eye color, gender, etc. Now explain that differences between things can help people identify not just individuals but also what kind or ***species*** a plant or animal is. A dichotomous key is a tool that can be used to help people identify species of things. Explain that the students are going to use a dichotomous key to identify weeds that grow in their neighborhood. First, however, they are going to practice using a key that will help them identify different types of candy.

(For younger students, you may want to now demonstrate how to use the candy key with a piece of candy in front of the class.)

2. Pass out a copy of the candy key to each individual or group of students (small groups can work nicely because each student will be able to help identify several pieces of candy.) Then pass the bowl of candy around and have each student take two different pieces. Tell them they will be able to keep or eat the candy IF they are able to correctly identify it using the key. Have them determine the "scientific" name of their candy, checking their work for accuracy.

3. Tell them that now that they know how to use a dichotomous key, you will give them one to help them identify real weeds that have invaded Montana and live near them. Pass out a **Weed Key** to each student. Explain that this key looks different but works the same way. **Make sure they understand that they should start at number 1 with each weed they are trying to identify.** Again, you may want to demonstrate with one specimen. Now hand out the weed specimens or photos. If there aren't enough specimens for each group to have one of each kind, they can pass them around.

4. Have the students go through the key for each weed, until they have found the name for each. You may want to monitor their progress during the first one to make sure they understand and are using the key correctly.

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5. When students think they have correctly identified the weeds, ask them to share their results. If there are disagreements or incorrect answers, ask them to go through and explain how they reached the name they decided on. Discuss whether the key was detailed and accurate enough to reach the correct conclusions. See if they have any suggestions for improvements, or if they might construct one differently. (Answer key to the dichotomous key is in the column at left).

6. Ask if they have seen some of these weeds before, and if so, where. Do they think they might be able to better identify weeds now that they've learned about them using the key?

7. Show your students the Dichotomous Key to Plants as an example of a "real" key used to identify plants and discuss what it would be like to use such a key. Ask why they think some of the language is so "technical."

Extensions

Have them research the problems associated with these weed species and why they are designated noxious weeds in Montana, using one of the resources listed below or in the **Resources** section of this guide.

Take students on a field trip (even a walking one from the school if there are appropriate ones nearby) to a "weedy" site and see if they can identify any weeds from the key.

Have your students make up their own key for native or invasive species from their schoolyard, yard, or nearby area.

Suggested Resources for learning more about noxious weeds in Montana:

http://weedcenter.org
The Center for Invasive Plant Management

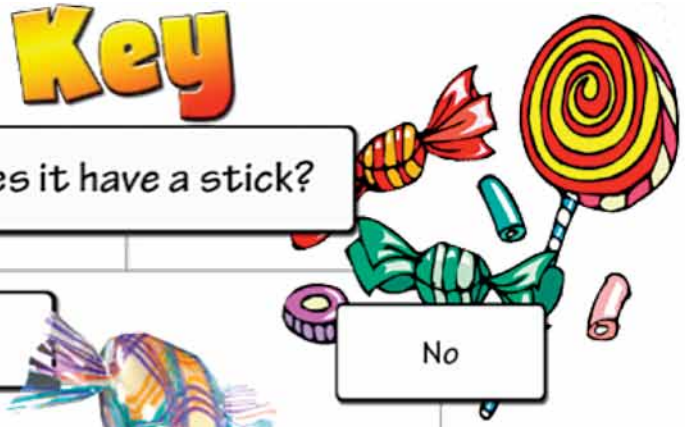
www.weedawareness.org Montana's Statewide Noxious Weed Awareness and Education Campaign Website

http://plants.usda.gov/index.html
The INVADERS Database System at The University of Montana

http://acwm.co.la.ca.us/PDF/invasive_weeds_book.pdf
Invasive weeds booklet for elementary students online

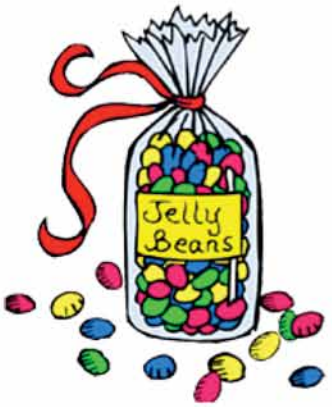
http://mtwow.org/
Montana War on Weeds

Candy Key



Does it have a stick?

- Yes. Roundus stickus
- No
  - Is it covered with foil?
    - Yes. Chocolatus coneus
    - No
      - Is it square?
        - Yes. Squaris fruitus
        - No
          - Are individual candies round & in a roll?
            - Yes. Roundus rollius
            - No. Hardus souris



Name _____

Dichotomous Key to Noxious Weeds of Montana

• START HERE FOR EACH PLANT:

1 I grow upright on a single main stem, or several branching stems. I may start with a rosette, or a cluster of leaves growing close to the ground.

→ **If this sounds like me, go to #2.**

OR

I grow on a creeping vine close to the ground, twisting around other plants, or up fences. I have smooth, arrow-shaped leaves 1-2 inches long and bell-shaped, white or pink flowers.

→ **I am: field bindweed** *(Convolvulus arvensis)*

2 My flowers are purple or reddish-purple.

→ **If this sounds like me, go to #3.**

OR

My flowers are yellow or greenish-yellow.

→ **If this sounds like me, go to #4.**

3 My leaves are large and wide, undivided into segments, with smooth edges and broad tips. My leaves are covered with fine, soft hairs and have a net-like pattern of veins. My reddish-purple flowers grow along a vertical stalk.

→ **I am: houndstongue** *(Cynoglossum officinale)*

OR

My leaves are oblong and narrow, being divided or lobed into many sections, with pointed or round, narrow tips. My light purple or pink flowers grow singly or in small groups at the end of stems.

→ **If this sounds like me, go to #5.**

4 My leaves are pale green, waxy, and heart-shaped, and clasp around the stem at their base. My bright yellow flowers grow upright on a long raceme, or stalk at the top of me.

→ **I am: Dalmatian toadflax** *(Linaria dalmatica)*

OR

My leaves are pale green, long, and narrow with smooth edges. My green flowers have yellow or greenish bracts (petal-like leaves) below them. They grow in a flat-topped or rounded cluster at the top of me.

→ **I am: leafy spurge** *(Euphorbia esula)*

5 My long, thin leaves have narrow lobes, or segments, with rounded tips.

→ **I am: spotted knapweed** *(Centaurea stoebe)*

OR

My leaves have sharp spines on the end of each lobe and at the tips.

→ **I am: Canada thistle** *(Cirsium arvense)*

Write the letter on each plant sample or photo beside the correct name:

_____ spotted knapweed

_____Canada thistle

_____Dalmatian toadflax

_____houndstongue

_____leafy spurge

_____field bindweed

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Dichotomous Key to Noxious Weeds of Montana

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ACTIVITY

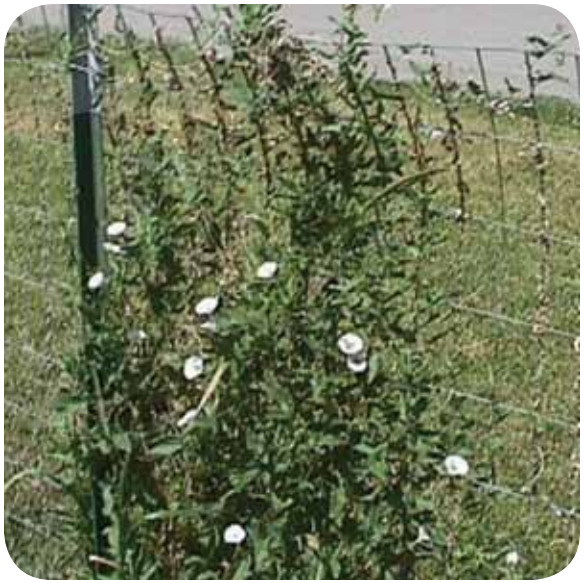
A

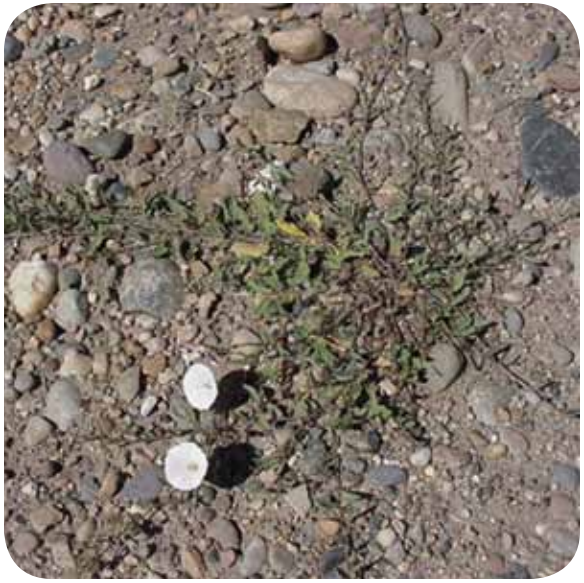
B

C

Photo: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

D





E

F

Dichotomous Key to Noxious Weeds of Montana

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Plants of the Sierra Nevada

Key to Dicotyledon Families

Sample key from:
www.backcountryrangers.com

A Plants parasitic or saprophytic, often not green
B Petals absent; plants usually green
C Parasite on upper limbs of trees - LORANTHACEAE (Not Edible)
CC Root parasite; leaves alternate, entire, oblanceolate - SANTALACEAE (Not Edible)
BB Petals present, more or less united
C Stamens more than 5 - PYROLACEAE
CC Stamens 5 or less
D Twining or trailing vines, not on roots - CUSTUTACEAE (Not Edible)
DD Root parasites - OROBANCHACEAE
AA Plants not parasitic or saprophytic or not completely so, always greenish
B Plants woody throughout (not just base)
C Leaves opposite
D Leaves compound
E Leaves palmately compound - HIPPOCASTANACEAE
EE Leaves pinnately compound or trifoliolate
F Vines - RANNUNCULACEAE (Clematis) (Not Edible)
FF Shrub or tree
G Fruit a samara
H Leaflets usually 3 - ACERACEAE
HH Leaflets 3 to 7 - OLEACEAE
GG Fruit a capsule or drupe
H Leaflets 3; fruit a dry capsule - STAPHYLEACEAE (Not Edible)
HH Leaflets 4 to 7; fruit a fleshy drupe - CAPRIFOLIACEAE *(Sambucus)*
DD Leaves simple
E Petals more or less united
F Leaves narrow-elliptic, margins revolute; boggy places - ERICACEAE *(Kalmia)*
FF Leaves broader; margins not strongly revolute
G Flowers irregular, leaves usually sessile; fruit a capsule - SCROPHULARIACEAE
GG Flowers usually regular; leaves petioled; fruit usually fleshy - CAPRIFOLIACEAE
EE Petals separate or none
F Stipules with thick corky persistent bases - RHAMNACEAE *(Ceanothus)*
FF Leaves without stipules
G Leaves serrate (except sometimes *Philadelphus* in SAXIFRAGACEAE)
H Leaves palmately lobed - ACERACEAE
HH Leaves oblong to roundish, without lobes
I Flowers 4-merous; petals 1 mm long - CELASTRACEAE (Not Edible)
II Flowers usually 5-7-merous; petals more then 6 mm long - SAXIFRAGACEAE
GG Leaves entire
H Leaves aromatic - CALYCANTHACEAE (Not Edible)
HH Leaves not aromatic
I Leaves thick, often scurfy; plants dioecious - GARRYACEAE
II Leaves thin; flowers perfect - CORNACEAE
CC Leaves alternate, whorled, bunched or basal
D Flowers in catkins
E Fruit an acron or bur - FAGACEAE
EE Fruit a winged nutlet, smooth nut, or capsule

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