A Prairie Year

Activity Overview
Students take part in a play that illustrates the seasonal march of a prairie as plants bloom and set seed.

Objectives
Students will:

- Use a model to explain an event in the natural world
- Take part in a play to illustrate the sequences of events in natural ecosystems that are repeated each year
- Identify changes in plants at different times of the year
- Increase understanding of prairie plant adaptations

Subjects Covered
Language Arts, Science, and Music

Grades
3 through 8

Activity Time
30 minutes

Season
Any

Materials
1 plant phenology card per student (1 set is 15 cards; see masters for making cards or have students create their own set of cards), musical instruments (if available)

State Standards
English Language Arts:

Use effective reading strategies (A.4.1, 8.1)

Read to acquire information (A.4.4, 8.4)

Create or produce writing (B.4.1, 8.1)

Plan, revise, edit, & publish writing (B.4.2, 8.2)

Orally communicate (C.4.1, 8.1)

Listen & comprehend oral communications (C.4.2, 8.2)

Participate in discussion (C.4.3, 8.3)

Use computers (E.4.1, 8.1)

Background

In order to avoid intense competition and to adapt to weather cycles, prairie plants have different seasonal periods of growth, flowering, pollination, and seed dispersal. As a result, we can experience a changing vista of colors, scents, insects and textures throughout the prairie year. One of the best-known and most dramatic sequences in the prairie involves the plants blooming from mid-April through October, as one blooming plant wanes and another takes center stage. During the growing season approximately one new prairie plant blooms each day. This sequential, or phenological, change is dramatic, somewhat predictable and easily observable.
Varied growth patterns is one way prairie plants have adapted to their environment. Most prairie plants are long-lived perennials that are able to slow their growth rates to share water, light, and minerals with crowded neighbors to create a complex and rich mixture of vegetation. Perennials are herbaceous plants that die back to the ground at the end of their growing season but survive underground by roots or a stem. Staggering the growth and flowering times is one way of decreasing competition for resources.

Many prairie grasses and forbs (i.e., wildflowers) have extensive root systems that allow them to survive fires, harsh winters, and droughts because they have buds at or below the soil surface and more root mass below ground compared to the biomass of the plant above the ground. The root systems of many prairie species reach depths of over six feet and some even extend as deep as twenty feet! By having extensive root systems, plus a variety of blooming times and different stem heights, prairie species have adapted to their environment and are able to coexist, filling every niche available in the prairie ecosystem.

This activity provides a kinetic introduction to help with plant selection for schoolyard restorations. The concept of phenology of different bloom times is applied to the process of species selection. One goal for developing an ecologically sound native planting, is to have at least one species blooming at any given time during the growing period. See Earth Partnership for Schools activity, “Prairie (Garden) Species Selection” for more information about selecting species based on phenology.

Fifteen plants are used to illustrate the seasonal changes that occur in a prairie: Bergamot , Lupine, Big Bluestem, New England Aster, Blackeyed Susan, Pasque Flower, Butterfly Weed, Prairie Dock, Compass Plant, Purple Coneflower, Goldenrod (Stiff), Spiderwort, Shooting Star, Yellow Coneflower, and Little Bluestem.

Activity Description

Everyone receives a card with a plant illustrated in its flowering stage on one side and in its seed stage on the other side. If musical instruments are available, have each student choose an instrument to represent their plant

A Prairie Year (cont.)

Science:

Decide which collected data is pertinent to new problems (A.4.2)

Decide which data should be collected (A.4.3)

Decide on changes that have occurred (A.4.5)

Develop themes for questions (A.8.1)

Use models to predict actions and events (A.8.6)

Use scientific sources & resources (B.4.1)

Use scientific vocabulary & themes (C.4.1)

Ask questions, plan investigations, make observations, predictions (C.4.2)

Select multiple information sources (C.4.3)

Communicate results (C.4.6)

Support conclusions with logic (C.4.7)

Identify questions using available resources (C.8.1)

Identify data and sources to answer questions (C.8.2)

Use inferences and observations (C.8.4)

Use knowledge, models, and theories to explain results (C.8.5)

Use computer software to organize data (C.8.8)

Find patterns and cycles in earth's changes (E.4.6)

Explain earth's cycles using observation (E.8.8)

Investigate how organisms respond to internal/external cues (F.4.2)

Illustrate organisms' life stages (F.4.3)

Show organism's adaptations (F.8.2)

Understand an organism's behavioral adaptations (F.8.7)

Show organism's place in ecosystems (F.8.8)

Explain survival and population growth of species (F.8.9)

in bloom. The play begins in the winter, crouch down as if you are dormant and underground. When you hear that your plant is blooming, stand up, and hold the card up above your head with the picture of the flowering plant showing. Play your instrument until your plant sets seed. When you hear that your plant is setting seed, flip your card over to show a seeding plant and stop playing your instrument. When winter comes again and the above ground portion of your plant dies, crouch down into the winter dormant state again.

SAMPLE PLAY NARRATIVE

It is a cold winter season. The days are cold and short. Nights are long. To most humans, the prairie looks lifeless. All above-ground portions of the plants are brown and brittle. But underneath, the roots are quite alive. (*All students should be in a group and crouched down. They are the roots of their plant.)* You are our prairie, your roots are alive but you can imagine a blanket of snow over your heads. The covering of snow and soil keeps the roots protected.

Now the days start to get warmer and longer. The snow melts, the soil warms. Plants start to grow and leaves start to emerge from the ground. *(Students start to sit up a bit. As their plant blooms, they stand up and hold their card up.)*

"Now it is *(insert month*) and the (*insert names of plants in bloom)* begin to bloom while the *(insert names of plants seeding*) stop blooming and begin to set seed." *[Continue through the months listed below]* "Now it is April..."

	BLOOMS	STOP BLOOMING, SET SEED
April	Pasque Flower	
May	Lupine Shooting Star	Pasque Flower
June	Butterfly Weed Yellow Coneflower Spiderwort Purple Coneflower Black-eyed Susan	Lupine Shooting Star
July	Big Bluestem Little Bluestem Compass Plant Bee Balm	Compass Plant Butterfly Weed Spiderwort Yellow Coneflower
August	Prairie Dock Goldenrod	Big Bluestem Little Bluestem Blackeyed Susan Bee Balm
September	New England Aster	Prairie Dock Goldenrod
October		New England Aster Purple Coneflower

Now the temperatures are getting colder and the days shorter and nights longer. The above ground portion of the plants dies and only the roots are alive. (*The students crouch back down)* The winter is back and the prairie once again looks dead. But it is not dead, it is alive and waiting. Waiting for another year.

Discussion

Discuss how adaptations such as extensive root systems and different blooming times enable prairie plants to survive in their environment. What are some threats to these plants' survival? Emphasize that there is a wide variety of ways plants and animals adapt to the prairie and other ecosystems. Have students visit the library to research other plant and animal adaptations in the prairie. Encourage them to expand on this play to include different plant and animal adaptations throughout the year.

Extensions

- Create your own cards. Draw the flowering plant form on one side and the seed form on the other. Use a field guide or other reference to draw and color the picture accordingly.
- Write a story that describes a plant and its seasonal adaptations.
- Keep a phenology journal and record plant changes during different times of year.
- Create other phenological sequences from either observations or research projects (see Earth Partnership for Schools Activities, "Observations From a Single Spot" and "Ecosystem Observation Cards."
- Write and direct a phenological play with younger students.
- Create a Phenology Book or Calendar that describes their observations throughout the year.
- Create a computer database to record seasonal observations.
- Read *A Sand County Almanac* (see especially chapters, "April" and "July" for prairie perspectives)

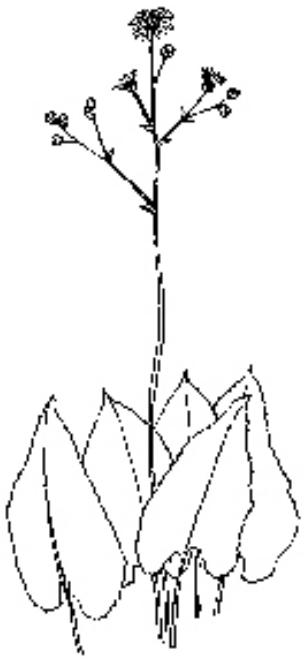
Additional Resources

- Bates, J. (1997). *A northwoods companion: Spring and summer*. Mercer, WI: Manitowish River Press.
- Bauer, C. & M. Smith Fry. (2000). *My nature journal: Explorations of the natural world using phenology.* Madison, WI: University of Wisconsin-Arboretum.
- Curtis, J.T. (1959). *Vegetation of Wisconsin*. Madison, WI: University of Wisconsin Press.
- Leopold, A. (1949). *A Sand County almanac*. New York: Oxford University Press.
- Levine, Carol. (1995) . *A guide to wildflowers in winter*. New Haven: Yale University Press.
- Locker, T.. (1995). *Sky tree*. Harper Collins Publishers, USA.
- Nichols, N., Entine, L., & E. Howell. (1996). *Prairie primer.* Madison, WI: University of Wisconsin-Extension.
- Stokes, D.W. (1976). *A guide to nature in winter.* Boston: Little, Brown & Co.
- Weber, L. (1996). *Backyard almanac.* Duluth, MN: Pfeifer-Hamilton Publishers.

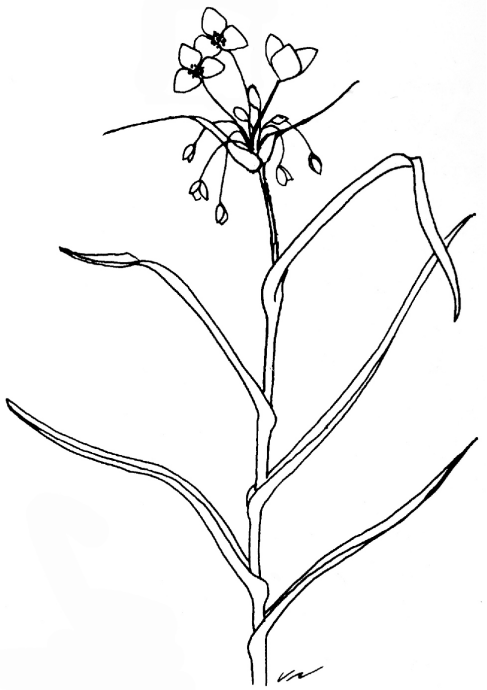
A Prairie Year (cont.)

Assessments

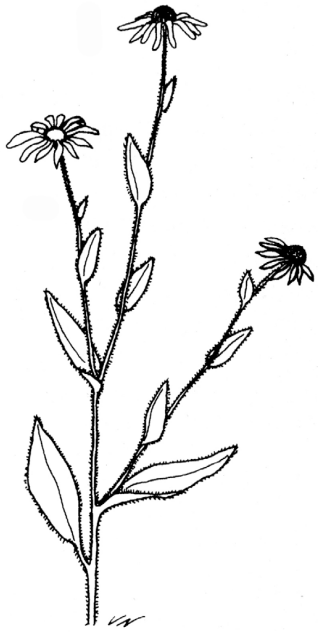
- List and explain at least 2 ways prairie plants have adapted to their environment.
- Have students describe how adaptations enable prairie plants to live in their environment.
- Have students a write a short story describing a prairie plant's adaptations and seasonal changes.
- Create a mobile with drawings illustrating the blooming and setting seed versions of different prairie plants and the time of year these changes occur.
- Research a prairie plant; describe its characteristics and seasonal adaptations. Make an oral report to the class and conduct peer reviews of these reports.
- Students develop a web page on a specific plant(s) using photos, drawings, and life history information.
- Students submit a research report on a specific plant and its life history.



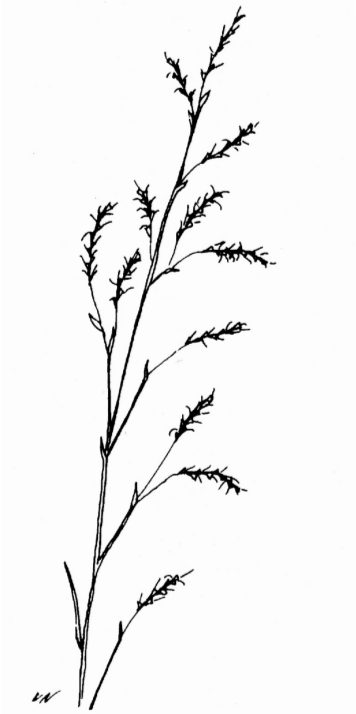
Prairie Dock



Spiderwort



Black-eyed Susan

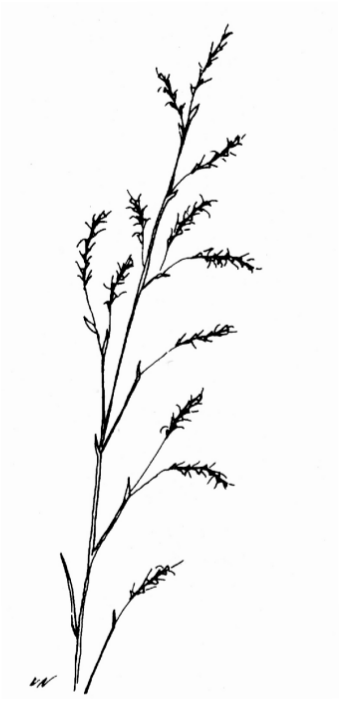


Little Bluestem

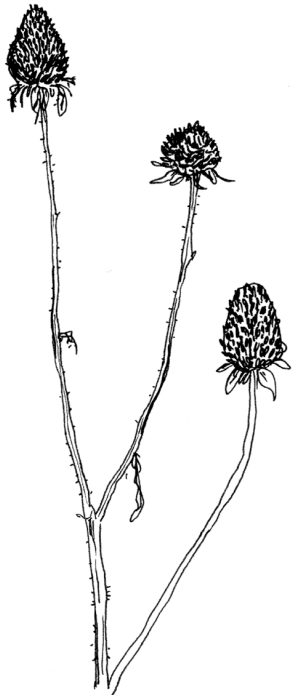
Sample Prairie Year Cards with plants in flower.

Spiderwort

Prairie Dock



Little Bluestem



Black-eyed Susan

Sample Prairie Year Cards with plants in seed.