Focused Study: Characteristics of Native Plants

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Does any of this sound like something you’d want? If so, please call us at (306) 668-3940 or e-mail us at info@npss.sk.ca

Free Electronic Resources on the Native Plant Society of Saskatchewan Website (www.npss.sk.ca)

- A Guide to Small Prairie Restoration - How to Grow Your Own Patch of Native Prairie
- Saskatchewan’s Native Prairie: Taking Stock of a Vanishing Ecosystem and Dwindling Resource (Also available in print)
- On the Prairie - A webpage on our site with a "Build a Prairie" game, field guide to prairie plants and animals, curriculum goodies like a English-Dakota language guide, and virtual reality panoramas of prairie places
- The Watershed Game

Free Printed Materials Available Through the Native Plant Society of Saskatchewan:

- Native Plants, Water and Us! (Booklet)
- Native Plants, Water and Us! (Poster)
- Native Plant Communities of Saskatchewan (Poster)
- Native Plant Communities of Saskatchewan (Activity Sheet)
FOCUSED STUDY: CHARACTERISTICS OF NATIVE PLANTS

GRADE 1

OVERVIEW AND PURPOSE
The scope of this study guide includes investigating basic plant structure, what plants need to grow, uses of plants and why they are important, as well as the importance of native plants and how they are different than introduced plants. This guided study is intended to target applicable and selected outcomes and indicators in several areas of the curriculum.

OUTCOMES AND INDICATORS
Compare observable characteristics (e.g., leaf, root, stem, flower, fruit, and seed) of plants of various types and sizes that live in different habitats.
Make and record observations and measurements about the observable characteristics of plants and animals using written language, pictures, and charts.

LT1.2 Analyze different ways in which plants, animals, and humans interact with various natural and constructed environments to meet their basic needs. [CP, DM, SI]

DS1.2 Inquire into the ways in which plants, animals, and humans adapt to daily and seasonal changes by changing their appearance, behaviour, and/or location. [CP, DM, SI]

PLANTS AND NATIVE PLANTS
This summary discusses characteristics of plants and native plants, using examples of a flowering forb, shrub and grass, as well as other species.

Western red lily, or tiger lily, is a good plant to use for the basic structure of a common forb, which is an herbaceous flowering plant that is not a grass, shrub or tree. It is also the designated provincial flower for Saskatchewan and is native to the province.

The saskatoon is a good plant to use for the basic structure of a common flowering shrub (woody plant that has many stems and is smaller than a tree) that is native to Saskatchewan. Many people who live in the Prairie Provinces or visit them have tried the fruit.

Needle and thread grass is a good plant to use for the basic structure of a common native grass that grows in natural grassland areas in many areas of the southern half of the province. The young grass is edible to many grazing animals until the needle-like seeds with long thread-like awns (tails) on the ends of the developing seed begin to form.

QUESTIONS
1. What are the parts of a plant? (roots, stem, leaf, flower and fruit or seed)

Roots: are the “feet” of the plant holding it in place. It is also like the mouth of the plant; the roots absorb the nutrients, including minerals dissolved in water from the soil, to feed the plant. The root of the western red lily consists of a bulb with small root hairs protruding from the bottom. In some plants, including the saskatoon, spreading roots help reproduce the plants through ‘suckering’, where new
plants emerge from root shoots, forming bunches or thickets of plants. Roots on the needle and thread grass are thin and fibrous, like many other grasses.

Stem: Grows up from the root and is the main structure above the ground which supports the plant and holds the plant up. The stem also transports the nutrients (food) and water to other parts of the plant. The saskatoon shrub has a woody stem, whereas forbs and grasses, including the western red lily and needle and thread grass, do not have a woody stem.

Leaves or foliage (many leaves): Is the organism of the plant that absorbs the sunlight and produces food for the plant through photosynthesis, much like a solar panel that produces electricity. Leaves have many shapes and sizes, such as linear (thin and narrow), round, heart shaped or even needle shaped, like on a spruce tree. Edges of leaves can also be different, and they may be smooth, toothed, wavy, or even have spiny tips, like a thistle. Leaves can grow in different ways on the stem, including leaves with alternating origins on the stem, and opposite on the stem (leaves growing out from the stem at the same point). Some plants keep their leaves for many years, such as the needles on spruce trees, while some plants lose their leaves every year in the fall (such as on elm or maple trees or the saskatoon).

Students should observe the leaf shape for the selected plants. Leaf shape on the western red lily is long and narrow lance to linear shaped. Leaf shape on the grass is also linear, but thinner than the lily. The saskatoon has round leaves with small teeth at the edges, mostly above the middle of the leaf. Internet sources can be found for comparing common leaf shapes, including the following: [http://en.wikipedia.org/wiki/Leaf_shape](http://en.wikipedia.org/wiki/Leaf_shape)

Flower: Is the reproductive part the plant, often producing a fruit around the seeds (such as an apple) to protect the seeds and help feed the seeds when they sprout. Many flowers have evolved or changed over time to be colorful and attractive to animals or insects, which help transfer pollen from one plant to another, thus helping plants make more seed and reproduce.

Students should observe the different flowers on the selected plants. The flower of the western red lily is a large red or orange bloom with 6 petal like structures. Students should be informed that in Saskatchewan, the western red lily is protected, meaning it cannot be picked, uprooted or destroyed in any way. [http://en.wikipedia.org/wiki/Western_red_lily](http://en.wikipedia.org/wiki/Western_red_lily)

The saskatoon has clusters of small white flowers that are produced when the leaves are still expanding in the spring.

The needle and thread flowers are tiny and are not very apparent. They grow in a cluster at the tip of the plant.

Fruit or seed: Fruits are the means by which many plants scatter seeds. Many plants have edible fruits, and the seeds within the fruits are moved about by humans and animals. Humans and many animals have become dependent on fruits and seeds as a source of food, which helps spread seeds.

Seed: Is the embryo (baby) of a plant. Seeds are often covered with a hard seed coat to protect the embryo. Seeds often have a food storage package inside the seed coat that helps the young plant to grow.
The small seeds of the saskatoon are contained within the berry of the saskatoon. The berry is a type of fruit called a pome, like an apple. This similarity is obvious when the berry is cut open and compared to an apple.

Note: seeds inside edible fruit pulp with similar ‘star’ shape arrangement and dried up flower at top of fruit.
The seeds of the lily are flat and are found in the three capsules/chambers of the dried flower head. Note the colourful flower of the western red lily in comparison to the white flower of the saskatoon.
The seed of the needle and thread grass is small and sharp-pointed (‘the ‘needle’) and is attached to a long awn (the ‘thread’) which curls and uncurls with changes in humidity and moisture. This allows the seed to drill its way into the soil which helps germination. The long curly awn also allows the seed to become attached to animals, thereby helping spread the seed.
2. What do plants need to survive and grow?
Most plants just need sunlight, air, water and soil in the right amounts. These amounts vary between plants.

3. Observable characteristics of plants: Plants are living creatures, and are made up of different kinds of cells, just like animals; we know this because they grow, reproduce and die.

Plants react to what's around them, just like animals, although their changes are usually slower than for animals. For instance, one day plants can look healthy and green, and over a few days or weeks, they can look sick and wilted, such as from being dried out from the hot summer sun. Animals may show signs of summer heat stress much sooner than plants, but animals can simply move to water and take a drink or seek shade, something that plants cannot do. Since plants and flowers can't move around like animals, they rely on adapting to their environment over time and use nature to help them move about and reproduce, such as how insects or wind move pollen from one plant to another, or how animals consume or rub against the seeds to move the seeds about. Wind can also carry seeds for a considerable distance. Plants may seem to be in one place, but they have their ways to move around, such as through seed movement. Some plants also have creeping roots, like raspberries, or runners (stolons) like strawberries.

3. How do people use plants?
People use plants in many ways, such as for food (saskatoon berries), medicine (headache remedy from willow bark, insect bite treatment from dogwood leaves), building things (wood from trees), writing (paper from trees), tools (making baskets from bark, bows and arrows from different shrubs or trees) and clothing (using fibres from flax).

First Nations used the bulb of the western red lily for food in soup and stews like a potato, as well as the unopened flower bud. A number of animals also use the plant as food.

The saskatoon shrub was important to First nations of the plains, who used the plant in many resourceful ways. They used the berries as food, including adding the fruit to dried buffalo meat (pemmican) to add flavour and preservative qualities. First Nations also used saskatoon berries to trade for other things. Saskatoons were often dried like raisins for winter storage and were cooked with bear grease and certain roots for soups and stews. The young straight shoots were used for arrow shafts. This plant continues to be important today for many who pick the fruit in the summer, and many orchards now have rows of saskatoons. The city of Saskatoon was also named after the First Nations word for the plant, which grows abundantly in the area.

4. Why are plants so important to the environment and the world around us? What are native plants and why are they important?

Plants help feed the soil, such as through decay of dead plant parts (composting). Plants also help control erosion, such as by limiting soil movement or landslides, by holding the ground in place with their roots. Plants also help clean and filter the water we drink and the air we breathe.

Native plants are plants that grow naturally in a place that is best suited for them and not brought in from other places; they were here before any people arrived. Native plants are adapted (suited, fit well) to local conditions and the area around them. Because they have adapted well over a very long time,
they can survive changes, such as fires, droughts and wet years, better than many introduced or domesticated (tame) plants. Native plants are also very productive and nutritious. As most ranchers on the prairies know, large areas of native grassland prairie provide better grazing for their cattle than areas that have been broken and planted with grasses and other plants from elsewhere. Importantly, because native plants and animals have evolved (changed, adapted) together, native plants provide the types of food and shelter needed by other native species (both plant and animal) to live. A good example here is how a large field of native grassland prairie will provide many kinds of food and shelter types (habitat) for more kinds of animals, including birds, than will a large field of a single species of wheat. Also, crops like wheat need to be seeded and harvested every year, which disturbs soils and possible nesting habitat.

5. Do all plants like the same conditions, such as being in the sun or in the shade, or being in wet soil or dry soil?

Different plants are found in different conditions. Plants such as cactus like full sun and dry soil, while water plants grow in wet places, sometimes with more shade. Would a cactus grow well in water, such as at the edge of a lake? Would water plants grow well in dry sand hills? Do we see cactus growing in water at the lake or in the dry hills?

Differences in the kinds of plants are often found where there are changes in the amount of sunlight (sun versus shade), amount of water (wet versus dry conditions) or even soil types (sandy versus salty versus loamy, the latter which is usually black, rich soil like what is found in most gardens). Saskatoons are usually found in moist areas, in coulees, river and stream banks, at the edges of bluffs and in open woodlands. Western red lily can be found in moist meadows and in native grasslands, but has become less abundant due to human changes in land use. Dryland plants, such as cactus and certain kinds of native grasses, including needle and thread grass, are usually found where there is lots of sunlight, not much water and in sandier soils that don’t hold water as well as other kinds of soil. Other plants, such as cattails, are usually found where there is more wet ground, often in low spots that hold water for at least some of the year. Some plants, such as ferns, usually prefer moist, shady areas. There are several native salt tolerant grasses and other salt tolerant plants in the prairies that are usually found growing well in salty or saline areas. Saline areas often have a whitish crust on the top of the ground.

6. What happens when the kinds of plants change, such as when weeds take over? How can you tell when the kinds of plants have changed? What happens when poisons are used to kill weeds?

When weedy species from different places start to take over, the weeds can choke out other kinds of good plants. When weeds are taking over, it is harder for other plants to survive. Weeds also make it harder for farmers to grow crops. Pesticides/poisons are sometimes used to kill weeds, but they can also harm other living things (other plants, animals).

7. Around where you live, what do you see mostly – big fields with crops like wheat, or natural areas? Which area probably has more weeds? Which area has more different kinds of plants? How can you tell the difference? Which kind of area, a farmers crop or a natural area, would have more kinds of wildlife? Why would a farmer’s cropland probably have more weeds?

In Saskatchewan today, most of the prairie has changed from what it used to be a few hundred years ago. Around most of the southern part of Saskatchewan, large farms have changed most of the area, from natural grasslands with many different kinds of plants and animals, to big fields that grow crops of
only a few kinds, often with more weeds and fewer kinds of animals. Weeds will often grow better in open crop fields as the ground is disturbed regularly, which makes it easier for weeds to establish. While we now have lots of crop fields and can grow more food, we have fewer natural areas.

**The big picture/main idea:** Understanding plants, including native plants, will improve awareness of the importance of plants for people, animals and the environment.

**ACTIVITIES**
Growing their own plants: Students to be encouraged to discuss what plants need to live, such as soil, water, and sunlight. Questions to ask include what area in the classroom would provide the best environment for the plants to grow and why (near a window will provide more light, while away from the windows will have less light).

1. One experiment that children will likely enjoy is “egg heads,” or using egg shells to grow grass. Take the top part off of as many eggs as needed (raw) and wash the egg shells gently. Cut the bottom cup parts off a cardboard egg carton so that each egg has its own resting cup. Next, glue the egg shell in the egg carton cup for stability. After the glue is dry, fill the egg shell with soil. Draw a face of a person or animal on each egg shell with a felt marker. Sprinkle the top of the soil with a pinch of native grass seed on half of the “egg heads” and the other half with a pinch of commercial (store bought) grass seed. Place a thin layer of soil over the seeds, add a bit of water, and place the “egg heads” in a window sill or other area with light. Water slightly as needed.

The students could measure the difference in growth height at different intervals and record the results. Other observations, such as how the grass looks (healthy and green, thick growth or thin, or wilted and yellow) could also be recorded. At the conclusion of the activity, students can record data such as height taken each day or week, on a class graph, and compare the growth between the types of seed used (see the following example graph).

Students may notice that the growth from the native grass seed may not be as thick or as tall as the store bought grass seed early in the experiment. Germination for native grass seed is sometimes delayed due to higher rates of dormancy, as the seeds may not germinate all at once. This is likely a survival strategy, so that some seeds will remain dormant (asleep) and germinate at a later time, perhaps when conditions may be better, and thereby increase the chances of longer term survival.

Students may also observe the root system and note that the native grass has put much of its energy into producing roots. Compare them with the store bought grass by removing the shell at the end of the experiment.
Egg Shells Growing Grass

Plant Growth (in cm) Over Four Weeks

Grass seed
Native grass seed

Native Plant Society of Saskatchewan
2. Another interesting experiment is to test the ‘drilling’ action of needle and thread grass seed. As noted earlier, the seed of the needle and thread grass is small and sharp-pointed (‘the ‘needle’) and is attached to a long awn (the ‘thread’) which curls and uncurls with changes in humidity and moisture. Place a few dry seeds on a plate, with the awns intact, add a few drops of water or mist to the seeds, and watch the action. It may take up to a minute for the curling to happen, and may take heavy misting. Native grass seed is available to teachers at the Native Plant Society of Saskatchewan, (306) 668-3940, or visit their website at http://www.npss.sk.ca/ to get the native plant materials supplier booklet to help source native seed.

3. Another simple experiment involves using beans, which have a large seed that allows students to easily observe seed structure. The seeds also germinate well, grow quickly, and show students how seeds turn into a plant.

Place several beans in a moist paper towel in a plastic bag until they just begin to sprout. Give each student a sprout and show them how to open the seeds carefully. Using a magnifying glass, students can observe the structure of the seed and growing embryo and clearly see how a seed grows into a plant. Encourage students to record their observations using a simple drawing with labels.

To extend the activity, students can test scientifically what plants need to grow. By using a new set of moistened beans, they can separate the beans into separate ziplock bags and test the following conditions (normal, no light, no water, no air, no food):

- Put a few beans in a moist paper towel inside a bag, keeping the bag slightly open, near a source of light.
- Put a few beans in a moist paper towel inside a bag, keeping the bag slightly open, and place in a dark location.
- Put a few beans in the bag only, without a moist paper towel, keeping the bag slightly open, near a source of light.
- Put a few beans in a moist paper towel inside a bag, and close the bag tightly after removing most of the air, and keep bag near a source of light.
- Take the seed apart so that a few embryos, without the food from the seed, are placed in a moist paper towel inside a bag, keeping the bag slightly open and near a source of light.

Students should check the bags daily and discuss the results they observe. What conditions did the beans grow the best, and which the worst? Why?
Bean Sprouting

Seed coat

Food for baby plant (or us)

Embryonic leaves

Ribbon root
ASSESSMENT
Have the students share their findings with each other in small groups or to the class.
Answer the following questions before the lesson and after the student presentations and/or activities:
1. The flower is the reproductive part of many plants, often producing ___________.
2. What native shrub produces a small purple berry that has a star shape inside it?
3. How does the awn on the needle and thread grass help the seed?
4. Name one plant used by the First Nations and describe how it was used.

INQUIRY
Explore, observe, listen, record, investigate, interpret, plan, and create.

Questions:
What is a native plant?  What is an introduced plant?

RESOURCES
Books:


Websites:

Center for Ecoliteracy
http://www.ecoliteracy.org/essays/systems-thinking

The Western Red Lily

Prairie Lily - The Summer Queen
http://www.ndsu.edu/pubweb/chiwonlee/plsc211/student%20papers/articles06/karen%20kirmis/karenkirmis.htm

Evergreen Native Plant Database
http://nativeplants.evergreen.ca/search/view-plant.php?ID=00400

Native Plant Society of Saskatchewan - On the Prairie (Online games, curriculum goodies and more!)
http://www.npss.sk.ca/games/

Native Plant Society of Saskatchewan - Watershed Games
http://www.npss.sk.ca/watershed/

Royal Saskatchewan Museum
http://www.royalsaskmuseum.ca/programs/education/our-programs

The Great Plant Escape Game
http://urbanext.illinois.edu/gpe/gpe.html

References:

