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# Chapter 3. The Lawn

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## Topic Sections in the Chapter

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Lawn Plant Distribution  
Discovering the Variety of Plants in the Lawn  
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## Introduction

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The most conspicuous habitat of the schoolyard is the mowed lawns and play areas around the school buildings. At first glance, the lawn may seem to be rather onedimensional, but closer examination reveals great diversity. The diversity of plants and animals will, of course, depend upon the diligence with which maintenance crews apply chemical controls. The variety and types of plants growing in the lawn also depend upon the nature of the environment bordering the schoolyard—whether it is a plowed field, forest, pasture, or developed area. Adjacent areas can be a source of seeds, which are carried by physical or biological means into the schoolyard.

The lawn **community** (the particular group of organisms found in the habitat) is artificially maintained by the expenditure of energy through mowing. Without this human controlled energy input, the lawn would follow a process of succession until it was finally replaced (in southwestern Virginia) by a **deciduous** forest community (deciduous trees are those that annually lose their leaves). In the following section on grasses you will be introduced to how the lawn mower can favor certain plants and discourage others. The plants in the lawn are in constant competition with each other for sunlight, minerals, water, and soil. Depending upon the cutting height of the lawn mower, certain kinds of plants may be more successful than others in this competition. Many other factors will influence the plants’ **distribution** (that is, where, and in what groupings, plants are

found; for types of plant distribution, see the Glossary entry for “distribution”).

## The Lawn and Environmental Conditions

Close inspection of the lawn around your school will reveal not only diversity of plants and animals but also different environmental conditions. These differences in environmental conditions will contribute to determining the differing biological features. For example, a sunny area that is subjected to heavy student traffic or play such as a well-traveled path or a baseball diamond—has very different environmental conditions from a shady, less-disturbed area. Only plants that can tolerate sun and traffic will be able to survive in the extreme environment at the edge of a baseball diamond. In shady, less-traveled parts of the lawn, a different assemblage of plants will be found.

## The Variety of Plants in a Lawn

The number of different plants found in the average lawn is often surprising to the casual observer. It is not unusual, after searching only a few minutes, to find 15 to 20 different kinds of plants. Some of the more common and conspicuous plants that you will encounter are described in this section. Many of these plants are not native to the United States and have

their origins in the herb and medicinal gardens of early settlers. Other plants were transported here inadvertently in a variety of ways, such as in hay for feeding animals on ships or in mud on the soles of shoes. Because of the variety of plants, the lawn is also home to many different animals that live on or feed upon the plants. The lawn can be used as a hands-on model that illustrates the diversity of life and the interdependence of living things. For example, consider a lawn where **herbicides** (plant-control chemicals), mowing, and perhaps watering have been used to favor the dominance of one plant species, such as Kentucky Bluegrass. In such a situation, most of the rest of the things living in that community depend heavily on the health of the dominant species, in this case the Kentucky

Bluegrass. A community so dominated by one species is generally thought to be ecologically unstable. Here's the reasoning. If the Bluegrass succumbs to a particular disease or event causing a catastrophic decline in its population, the effect on the rest of the community could also be disastrous. Plant-eating, or **herbivorous**, animals feeding on the grass would lose their food source, as would **predators** feeding on the plant eaters, and soil that was held in place by the thriving grass's roots could be washed away. Once students begin thinking about such connections in a familiar habitat, an analogy to the importance of maintaining biodiversity on our planet is easy to make.

## Introductory Lawn Inquiries

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These lines of inquiries involve observations outside as well as collection of lawn plants to take inside and examine more closely. Useful materials: zip-lock bags, hand lenses, rulers, meter sticks.

### Identifying Different Environmental Sites in the Lawn Habitat

*Take your students out to the lawn for observations. Instruct them especially to look for areas of contrast.*

Does the lawn look the same everywhere?

Point out some areas that look different, and describe the differences you see.

Why are some areas different than others?

How is the environment different in these areas?

What could you measure to describe how the environment differs in different places?

### Lawn Plant Distribution

Can you detect patterns in the location of plants in the lawn? Are the distributions clumped, random, or uniform? (*See the Glossary, under "distribution," for these terms.*)

Do trees seem to affect the distribution of the plants? How can they do so?

What other factors seem to affect the distribution of plants? How do humans affect plant distribution?

### Discovering the Variety of Plants in the Lawn

How many plants do you think you would find in the lawn?

Write down a prediction of how many plants you think we could find. Divide the class into groups of four. Give each group a plastic bag to collect plant parts. Allow approximately 10 minutes for the search, then return indoors with the plants.

Lay the plants out on a piece of paper and separate all the different kinds.

What features make plants look different?

What features did you use to tell plants apart?

How many kinds did you find? How does this compare to your prediction?

What are some unique or interesting features of each plant?

Look at a plant closely with a hand lens. What features are now visible that you couldn't see before?

Sketch a picture of your favorite plant, and describe the features of this plant.

How could you use the plants' features to put them into groups or categories?

## Common Versus “Rare” Plants

Do some plants appear in larger numbers than others?

Which appear to be most common? Least common?

What is a rare species? Would you say that any of these plants are rare?

How do “rare” species in your lawn compare to endangered species in the world?

How are rare or endangered species protected?

Do the rare plants in your lawn need to be protected? If you needed to protect these species, how would you do it?

Why might it be good to have a lot of different kinds of plants in a habitat?

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# Grasses

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## Family: Poaceae, the Grass Family

The Grass Family is one of the largest plant families in the world. The family includes some of the world's most economically and ecologically important plants: Rice, corn, wheat, rye, barley, sorghum, sugarcane, and bamboo are all grasses. It would be hard to imagine today's societies without these plants. The seeds of grasses, also known as grain crops, are rich in protein, carbohydrates, and oils and provide the main food base for many cultures. Even in societies where beef is consumed in large quantities, forage grasses still provide the food base to raise these animals. In many parts of the world, grass is the dominant vegetation or ground cover.

Grasses have true **flowers**, but one has to look closely to find their flowers. You can observe these flowers on the ends of mature grass stalks that have not been mowed. Different kinds of grasses will have uniquely arranged flower clusters. Grass flowers characteristically lack the brightly colored and conspicuous petals we usually associate with flowers. Grass flowers also lack **sepals**. The actual reproductive structures usually include three **stamens** (the male, pollen-bearing part of the flower) with two feathery-tipped stigmas where pollen is collected. (You may be more familiar with the term pistil. The stigmas are part of the pistil, the female part of the flower.) A grass leaf is long and narrow with parallel **veins** (the tubular structures that carry materials to and from the leaves). The leaf wraps around a hollow **stem** forming a structure called a sheath. Where the leaf attaches there is a bulging joint which forms a distinguishing characteristic of the grasses—jointed stems. Bamboo shows this feature nicely.

## Grasses and Mowing

In much of the eastern United States, grass as a ground cover has to be maintained by frequent mowing. In southwest Virginia, as in many other part of the country, an unmowed lawn would eventually revert to a deciduous forest, the type of **climax community** that results from succession in much of the eastern United States. There are, however, some natural grasslands in some limestone areas, and some grass habitats were maintained in the past by human-caused or natural burning. Grazing by

livestock maintains the grass community in pastures.

In the driest parts of the United States, people who desire lawns must water them frequently or else the lawn will revert to a desert, cactus-dominated community. But in other parts of the United States and of the world, grasses are the dominant plants making up the climax community. In general, these grasslands exist without trees because there is not enough rainfall to support the growth of large woody plants, but there is enough rainfall to support the grass community.

Grasses are able to thrive despite frequent mowing, for several reasons. First, they have growth centers in their stems below the point where the leaves are attached. In other plants, the growth center is located at the *tip* of the stem. Removal of this tip would cause that part of the stem to stop growing; however, growth could continue at the tips of side branches. Mowing, therefore, eliminates many plants that would otherwise overtake and grow above the grasses. Because grasses have growth centers near the base of the stem, these plants are also able to tolerate grazing and frequent fires as well as mowing. These tolerances have allowed grasses to be highly successful during their evolutionary history.

Many grass plants in lawns rarely produce seeds because of the low height at which we maintain the plants. Nevertheless, the grass seems to be able to multiply efficiently. Depending on the particular type of grass, grass plants can reproduce vegetatively by means of underground or above-ground horizontal stems that form dense mats of plants.

Another adaptation of grasses that has contributed to their success is their root system. Grasses have a network of many small roots, called a fibrous root system. This root system can extend both deep into the soil and far outward horizontally. This makes for a very efficient water- and nutrient-collection system. One study found the root system of a single rye plant to have a total combined length of 387 miles! Most of the living mass of grass plants occurs under-ground where water and nutrients are stored. This trait also enables the plant to survive grazing, fires, droughts, and frequent mowing. The extensive fibrous root systems of grasses and their relatively fast growth make grasses ideal for stabilizing soil and reducing erosion.

In short, while grasses have not adapted specifically to lawn mowers, they have over time developed many traits in response to other environmental factors. Many of these traits have made grasses tolerant of mowing, as well.

More than 1,400 species of grasses have been identified in the United States. Below we have described four species that are common in lawns in southwestern Virginia. The table at the end of this section summarizes some features that distinguish these four kinds of grasses. The drawings of each grass also point out distinctive features.

## Common Types of Grasses

**Goosegrass** (*Eleusine indica*). This grass is typically found in areas that are experiencing environmental stress, such as around playground equipment, along the edge of pavement where cars park, or along a path. Goosegrass is sometimes confused with crabgrass, which is described next. Goosegrass can be distinguished by its flattened stems that usually trail on the ground and form a flat, mat-like growth.

**Crabgrasses** (*Digitaria* species). This well-known type of grass is the scourge of many homeowners who try to keep it out of their yards. One reason this type of grass is so unpopular is that, unlike preferred varieties of grass, crabgrasses are **annual** plants (plants that complete their life cycle in one year) and die back with the first frost, brown patches in the lawn and voids where other weeds may invade. Two kinds of crabgrass found in southwest Virginia are **Smooth Crabgrass** (*Digitaria ischaemum*) and **Common Crabgrass** (*Digitaria sanguinalis*) (which is more common). Both of these grasses grow in clumps or dense mats, are light green in color, and have flowers arranged on distinctive finger-like stalks.

**Tall Fescue** (*Festuca elatior*). This grass and Kentucky Bluegrass are the most common grasses planted in southwestern Virginia. Tall Fescue is a **perennial**, so, unlike crabgrass, a single plant can grow back year after year. This grass is often favored in this area because of its tolerance of hot, dry weather. It is characterized by relatively wide (4-8 millimeters—about 1/6 to 1/3 inch) leaf blades, and flowers or seed heads appearing in tufts. Distinctive bulges along the stem will help you identify this grass (the bulges actually mark the base of the leaves, which wrap tightly around the stem for some distance). You may find Tall Fescue growing in dense patches in a Kentucky Bluegrass turf. The patches expand slowly during the growing season by producing new shoots around the edge of the mat.

Tall Fescue was originally introduced from Europe as a forage crop for cattle. Subsequently it spread rapidly into favorable habitats, sometimes to the detriment of native plants unable to compete with this grass' ability to spread and establish itself. Today, Tall Fescue is widely planted for lawns, parks, athletic fields, and roadsides.

**Kentucky Bluegrass** (*Poa pratensis*). This is probably the most popular and widely distributed of the grasses grown in lawns. It is famous for its lush growth, especially on the horse ranches in the limestone rich soils of Kentucky—the Bluegrass State! Over 700 varieties have been developed by horticulturists. In mowed lawns, the grass has relatively thin blades: less than 4 millimeters (about 1/6 inch) wide. If you look closely at the end of an *uncut* blade, you will see a distinctly boat-shaped tip. Mature plants that have not been mowed can also be identified by their distinctive pyramidal clusters of flowers or seeds. Kentucky Bluegrass is a perennial and spreads by a type of underground stem called a **rhizome**, so it appears less clumped than Tall Fescue.

## What to Look For in a Common Schoolyard Grass

| Kind of Grass      | Distinctive Features  |
|--------------------|---|
| Goosegrass         | Growth is mat-like<br>Flattened stems   |
| Crabgrass          | Grows in clumps Light green color<br>Flowers on finger-like stalks                        |
| Tall Fescue        | Grows in clumps<br>Bulges along stem  |
| Kentucky Bluegrass | Growth spread out (not clumped)<br>Relatively thin leaves<br>Leaves with boat-shaped tips |

### Grass Inquiries

*Students will observe the lawn as a whole as well as individual plants and parts. Useful materials: plastic bags, hand lenses, trowel.*

#### General Grass Inquiry

Is all "grass" the same?

What features do different grasses share?

How are grasses different from some other familiar plants?

Pick a blade of grass from the lawn and describe or sketch its features.

How many different kinds of grass plants can you find in the lawn?

Try looking at the lawn from a distance and look for changes in color or patterns in the observed textures of the lawn surface. Compare the

blades of grass from these locations. How do they compare? Are they actually different kinds of grass?

What features did you use to tell the kinds of grasses apart?

#### Grasses and Mowing 1: Growth

How do grass plants grow?

How does a grass plant increase in height? Where is new plant material added?

Can you design a way to show how a grass plant gets taller?

How does this way of growing help grass plants to survive, despite frequent mowing that discourages the growth of other plants? How does this pattern of growth compare to other plants?

## Grasses and Mowing 2: Flower and Seed Heads

Have students pick a blade of grass from an unmowed area and compare it to the grass in the lawn.

How are they similar? How are they different?

Do you think they are the same kind (species) of grass?

If they are the same, why do they look different?

How does mowing the lawn regularly affect the form of the grass plants?

Do the grass plants in the mowed area produce seeds? Why not? Compare them to grasses in the unmowed area. Do they produce seeds? How can you explain the abundance and density of the grass plants in

the lawn if mowing reduces seed production?

Do different kinds of grass in the lawn have different ways of producing new plants?

What evidence can you find to show that grass plants can reproduce themselves without producing seeds?

## Grasses and Mowing 3: Grass Roots

*Use a trowel to dig out square plugs of grass about 10 centimeters (4 inches) wide. Let groups of your students examine the plugs.*

Describe the structure of the roots.

Try to remove some of the soil from the roots. Is it easy to do?

How does this property explain why grass is often planted on the sides of roads and highways immediately after construction?

Why is it important to plant grass at such sites as soon as possible?