

Green-Up Protocol



Welcome

Introduction

Protocols

Learning Activities

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Purpose

To observe plant green-up and report data that will be used by scientists to validate satellite estimates of the beginning of the plant growing season

Student Outcomes

Students will learn stated key concepts and be able to apply process skills in understanding patterns of green-up among plants.

Overview

Students monitor budburst and growth of leaves of selected trees, shrubs, or grasses. Species chosen should be native, deciduous, and dominant in your area.

Time

Field time: 20 minutes excluding travel time.

Level

All

Frequency

At least twice a week beginning two weeks prior to the anticipated start of green-up, if possible

Key Concepts

- Green-up differs among plant species.
- Green-up differs among locations.
- Green-up is related to climate.
- Green-up marks the start of photosynthesis for the season.

Skills

- Estimating dominant plant species*
- Identifying plant species (advanced level)*
- Observing leaf growth*
- Making leaf measurements*
- Recording leaf measurement data*
- Calculating percentages*

Materials and Tools

- Ruler with mm marks
- Flagging tape, 1 label per student
- Pencil or pen
- Green-Up Data Sheet*
- Grass Green-Up Field Guide* and/or *Tree and Shrub Green-Up Field Guide*
- Dichotomous keys and/or other local species guides
- Compass
- Camera
- Calculators (optional)

Preparation

Review dominant plant species of school's GLOBE Study Site.

Prerequisites

- Green-Up Cards Learning Activity*
- Budburst Sneak Preview Learning Activity*
- Practice mm length measurements with ruler.
- Knowledge of common plant species at the site

Tree and Shrub Green-Up Protocol

Field Guide

Task

Observe and record green-up in trees and shrubs.

What you Need

First visit only

- | | |
|--|--|
| <input type="checkbox"/> Green-Up Data Sheet | <input type="checkbox"/> Fine-Tip Permanent Marker |
| <input type="checkbox"/> Pencil or pen | <input type="checkbox"/> Camera |
| <input type="checkbox"/> Ruler with mm units | <input type="checkbox"/> Compass |

Every visit

- | | |
|--|--|
| <input type="checkbox"/> Green-Up Data Sheet | <input type="checkbox"/> Ruler with mm units |
| <input type="checkbox"/> Pencil or pen | |

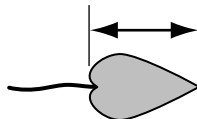
In the Field

First time only/getting started

1. Complete the upper portion of your data sheet.
2. For the selected tree or shrub, locate the bud at the end of the branch. Label this bud by marking one dot on the branch next to the bud.
3. Locate the three other buds closest to this bud. Label these buds by marking two, three, or four dots next to them.
4. Take a photograph from the center of your site looking in the north, south, east, and west directions.

Every visit

1. Examine each bud.
 - Record “dormant” if the bud is unchanged.
 - Record “swelling” if the bud is getting bigger.
 - Record “budburst” the first day you see the green tips of leaves.
 - Record “lost” if something happens to the bud and you cannot continue observations.
2. After each budburst, use a ruler to measure the length of the leaf or leaves. Do not include leaf stem or petiole in your leaf measurements.



3. Measure the leaves until the leaf length stops increasing. Different leaves may stop growing at different dates.

Grass Green-Up Protocol

Field Guide

Task

Observe and record plant green-up in grasses.

What You Need

First visit only

- | | |
|---|--|
| <input type="checkbox"/> <i>Green-Up Data Sheet</i> | <input type="checkbox"/> Ruler with mm units |
| <input type="checkbox"/> Pencil or pen | <input type="checkbox"/> Camera |
| <input type="checkbox"/> Fine-Tip Permanent Marker | <input type="checkbox"/> Compass |

Every visit

- | | |
|---|--|
| <input type="checkbox"/> <i>Green-Up Data Sheet</i> | <input type="checkbox"/> Ruler with mm units |
| <input type="checkbox"/> Pencil or pen | <input type="checkbox"/> Fine-Tip Permanent Marker
(until four new grass shoots have been marked) |

In the Field

First time only/getting started

1. Complete the upper portion of your data sheet.
2. Before new grass shoots emerge, take a photograph in the north, south, east, and west directions.

Every visit

1. Look for new green grass shoots.
2. Mark the base of the first grass shoot with a single dot.
3. Mark the second shoot with two dots, the third with three dots and the fourth shoot with four dots.
4. Use the ruler to measure the length of the shoots to the nearest millimeter.
5. Measure the leaves until the leaf length stops increasing.