Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_

**Decomposition: Leaf & Soil Collection Worksheet**

**Trees that lose their leaves**

Trees that lose all their leaves once a year are called deciduous whereas trees which lose their leaves continuously and not all at once are called evergreen. In temperate regions that experience cold winters, many tree species lose their leaves with the onset of the cooler weather in autumn. These deciduous forests once covered large areas of temperate Asia, Europe and North America. Superb autumnal leaf colors can be seen in the deciduous forests of Canada and New England. They are not the only regions where deciduous trees are common however, and tree species in many sub-tropical and tropical regions which experience a strongly seasonal rainfall, also lose their leaves once a year with the onset of the dry season e.g. the African acacia trees. Such trees are common in the savannas and woodlands of Africa, South America and Asia.

**Why do trees lose their leaves?**

Leaves are expensive organs for a tree to build and maintain. During winter (in cold climates) or the dry season (in warmer climates) it becomes difficult for the tree to maintain its water balance as there is less free water available in the soil. It is thus difficult for the tree to keep its leaves turgid and the cells of the tissues in the leaves would become damaged by the cold in temperate areas, or the heat in warmer areas. Instead of remaining actively growing during this time of the year the tree enters a dormant period.

Trees are adapted to the climate of the area where they grow. They do not wait for their leaves to be damaged by the harsh conditions of the winter or dry season before losing them. They prepare in advance for the onset of the unfavorable season by getting ready to lose their leaves. The enzymes that control processes in the leaves (processes such as photosynthesis) contain nutrients which are valuable to the tree because there is a limited supply in the soil from where they are absorbed. Before the tree abscises or separates off its leaves, it breaks down many of the organic compounds and reabsorbs the valuable nutrients from its leaves. It will reuse these in the next growing season. Nutrients which are reabsorbed from leaves include nitrogen (N) and phosphorus (P). Each tree species absorbs its own unique amount of nutrients, leaving the remainder in the leaves that falls to the ground. This means that leaf litter from different species differs in the amount of nutrients within them. Below is a table of nutrients in different tree species' leaves:

|  |  |  |
| --- | --- | --- |
|  | P | N |
| Sugar maple | 1651.585 | 2.072 |
| White ash | 2472.203 | 2.47 |
| Black cherry | 2720.057 | 3.483 |
| Red oak | 1658.972 | 2.166 |

 **Reading Questions:**

1. Define the following words using context clues from the text and your own knowledge.

a. Deciduous:

b. Evergreen:

c. Turgid:

d. Dormant:

e. Photosynthesis:

2. Which two major nutrients are often absorbed by the tree before trees drop their leaves in preparation for the winter?

a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. We are going to conduct a simple experiment and collect a sample of fallen leaves and soil from a tree using a ***quadrat***. A quadrat is a given amount of area from which you will collect all of a tree's leaves. How do you think the amount of leaves will differ based on the type of tree you are studying? Write your hypothesis below.

Hypothesis:

|  |
| --- |
|  |

Procedure:

1. In your laboratory group, move to the tree assigned to you by your teacher.

2. At the designated distance, collect ALL of the un-decomposed leaves in the hula hoop/quadrat that belong to the tree you are studying. Make sure that you are only collecting tree leaves from the correct species as many species look very similar. Repeat at another spot along the transect if there is time.

 Number of leaves collected (sample 1): \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Number of leaves collected (sample 2): \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Average: \_\_\_\_\_\_\_\_\_\_\_\_\_

3. Using the trowel, collect the top two inches of soil from a 8"x12" area within your quadrats. Place it inside a labeled plastic bag.

4. Share your data on the number of leaves you found with the class.

5. Create a graph of the class data of the numbers of leaves vs. tree species.

a. Create a title for your graph

b. Label your axes (tree species, number of leaves)

d. Under your graph, write a one paragraph analysis of the graph describing any trends that you see. Include whether your hypothesis was supported or not.

**Data Table**: Leaf Litter Collection versus Tree Species

|  |  |  |
| --- | --- | --- |
| **Group**  | **Tree species** | **# leaves collected** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Analysis Questions:**

1. Compare your data with the data from the rest of your class. How does the amount of leaf litter differ between species?

|  |
| --- |
|  |

2. What are some potential reasons for the differences between the amount of leaf litter for different species? Provide at least two reasons.

|  |
| --- |
|  |

3. If you were able to collect a sample of soil and perform a nutrient analysis, compare the nutrient levels between tree species. Explain two potential reasons for these differences.

|  |
| --- |
|   |

4. If you weighed the leaves, compare how the weights differed between species. Explain two potential reasons for these differences.

|  |
| --- |
|  |

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_

**Leaf & Soil Collection Using Transects**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tree Species** | **Sketch of Leaf** | **Amount of leaves (number)** | **Weight of leaves (optional)** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

We know that different foods have different nutritional values. Remember that tree leaves are a source of food for many organisms. Considering this, it makes sense to assume that these different species of trees contain different amounts of nutrients in their leaves. Using this assumption, create a hypothesis and give at least one supporting statement to suggest which leaf you believe has the greatest nutrient content.