



Leaf Litter Critters

Duration: 45 minutes
Location: School yard plot
Materials: Data sheets, clip boards, pencil, and one insect collecting set for each group (includes insect aspirators, jars or bug boxes, field sifter, magnifying glass)
Curriculum Areas: NC 6th grade Science, Math & Language Arts

VOCABULARY AND DEFINITIONS:

Aspirator: (a.k.a. pooter, sucky-uppy thingy) A piece of scientific equipment used to collect specimens that are too small to be picked up by hands or with tweezers.

Biological Inventory: A technique used by scientists to make a count of a particular species or ecosystem at one point in time.

Biological Monitoring: A technique used by scientists to check the condition of a particular species or ecosystem over time. Monitoring usually consists of comparing inventories with one another to establish trends.

Humus: The part of the soil profile that is composed of decomposed organic matter from dead and decaying plants and animals. Also called the duff layer.

Leaf Litter: The covering over soil in a forest made up of leaves, needles, twigs, branches, stems and fruits from the surrounding trees.

Macro-invertebrate: An animal without a backbone that is large enough to be seen without a microscope.

LEARNER OBJECTIVES:

The learner will: 1) recognize the diversity of soil insects in their school yard, 2) recognize the diversity in the way scientists study insects, and 3) use an insect key to sort insects into groups by their scientific order.

INSTRUCTOR TASK (overview):

The instructor will assist the students in monitoring the biodiversity of species in their school yard plot(s) (example: 10m x 10m). They will study the species richness or diversity (what species are here) and the species evenness or density (how common are those species).

All plants and animals are important to the ecosystem, and learning about the smallest of animals is as important as learning about the big animals like bears and deer. Why do you think this is the case? It is also important to look at the main tree species that surround the plot. Why do you think this is important? (Different species of insects and spiders need different amounts of shelter, different amounts/types of leaf litter. Also, the plant life growing in an area can tell you something about the type of soil in an area e.g. the Rhododendron shrub (pH 4.5-6.0) grows in more acidic soil than a maple tree (pH 6.0-7.5).

INSTRUCTOR TASK (instruction):

The first step in inventorying insects and spiders is collecting. Show students the techniques they will use to collect insects.

Divide the students into groups, providing each group with a few insect aspirators, collection jars or bug boxes, magnifying glasses and one field sifter set (see "Make Your Own Field Sifter" below; aspirators available through many scientific field catalogs such as Forestry Suppliers or BioQuip). Instruct the students on how to collect the data and use the identification keys/field guides. Identification is the basis for classifying insects, learning about their distribution, their life history and their significance to the ecosystem. Keep track of what you find on the Invertebrate data sheet. Release all insects after review.

STUDENT TASK:

Participate in insect collection, identification and data collection.

INSTRUCTOR TASK (closure):

Regroup the students and review the data collected. Explain that each group will need to pick a spokesperson to explain their role during the concluding activity. Have students enter their data into the "Hands on the Land" website.

INSTRUCTOR TASK (Post-field work, back in the classroom):

If the students were working in small groups, compile each group's data onto one data sheet. Then post the information in a way that each student can see the data. Have the students determine the species diversity and species density.

Species density: this determines the number of like species in a defined plot (area).

$$\text{Density} = \frac{\text{\# of individuals of like species}}{\text{Total area of plot (length x width)}}$$

Species diversity: used to determine the percentage of one species in the total area surveyed.

$$\text{Diversity} = \frac{\text{\# of individuals of like species}}{\text{total \# of all specimens found}}$$

If this is not the first time doing an inventory in this spot, compare data with previous year's data. Note any changes.

Make Your Own Field Sifter (a.k.a. Shaker Box)

MATERIALS:

Plastic shoe box with lid
Wire mesh (1/4 inch hardware cloth)
Roll of craft wire
Nail for punching holes to "sew" with craft wire
Tube of silicon caulking or hot glue
Tin shears or wire cutters
Sharp knife

DIRECTIONS:

1. Place the plastic shoe box on top of the piece of wire mesh and mark on the mesh the perimeter of the container.
2. Cut out the pattern on the wire mesh approximately $\frac{1}{4}$ inch smaller than the actual pattern marked on the wire so it will fit snugly in the bottom of the shoe box.
3. Cut out the bottom of the shoe box leaving an inward lip of the bottom approx. $\frac{1}{2}$ inch wide to attach and support the mesh on the inside of the box.
4. Using the nail, punch about 16 evenly spaced holes around the $\frac{1}{2}$ inch lip. Place the wire mesh in the bottom of the box so it fits snug against the lip. Then "sew" the mesh to the shoe box with the craft wire, attaching it to the lip.
5. Apply a generous amount of silicon caulk or hot glue around the inside of the box bottom on top of the inner lip and on the edges of the wire mesh. Allow to dry.
6. To use your box, put the mesh bottom box inside the shoe box that hasn't been altered. Take the two boxes into the field and making sure the mesh bottom is the box on top, fill it about halfway full with leaves and topsoil.
7. Put one of the lids on the mesh bottom box and with the two boxes still together, shake the entire unit for about 15 seconds.
8. Take the mesh bottom box off and search through the debris in the bottom of the complete box for anything that moves. Use an aspirator to collect the invertebrates.
9. Use the "Guide to Insect Orders" to try to identify what you find. Keep track of your find by using the "Insect Data Sheet".