

Lesson 4: Roots Really Do Matter

Science Lessons | Grades 6-8



Overview:

The roots and their hidden ecosystem play a critical role in the ability of all parts of the tree to sequester carbon. Roots anchor a tree and bring up water and nutrients, but in partnership with a healthy fungal system they do much more. In this activity, let's talk about the cycle of nutrients and carbon.

Background Information:

The roots of tree are limited in their ability to reach all the available nutrients and water. A root is covered with hairs that help with this, but the real partner is a fungus. This fungus is called Micorrhiza. It extends the roots through fingers that are far reaching. The benefits:

- 1) Carbon in the form of glucose feeds the fungus in turn, storing carbon
- 2) The tree gains minerals and water from the Micorrhiza.
- 3) The more extensive the roots/micorrhiza, the more water the roots can store.



If leaf litter is left to decompose around the base of a tree, the roots and micorrhiza can use this resource. The fungus will help to break down the leaves. The decomposed matter becomes part of the soil, storing carbon from the leaves. This organic matter further builds a healthy soil system that will enhance water storage, feed the fungi, and improve nutrient absorption for the tree. Use the diagram to discuss symbiosis of the oak tree and micorrhizal fungus.

Activity: what are the conditions of the trees at your school or home?

Gently dig a 4-inch deep hole a few feet out from the trunk of your tree. Record your observations on a separate sheet of paper. (If it is safe to leave the hole that you used in this activity, then you can perform the soil testing in the next activity from the same hole).



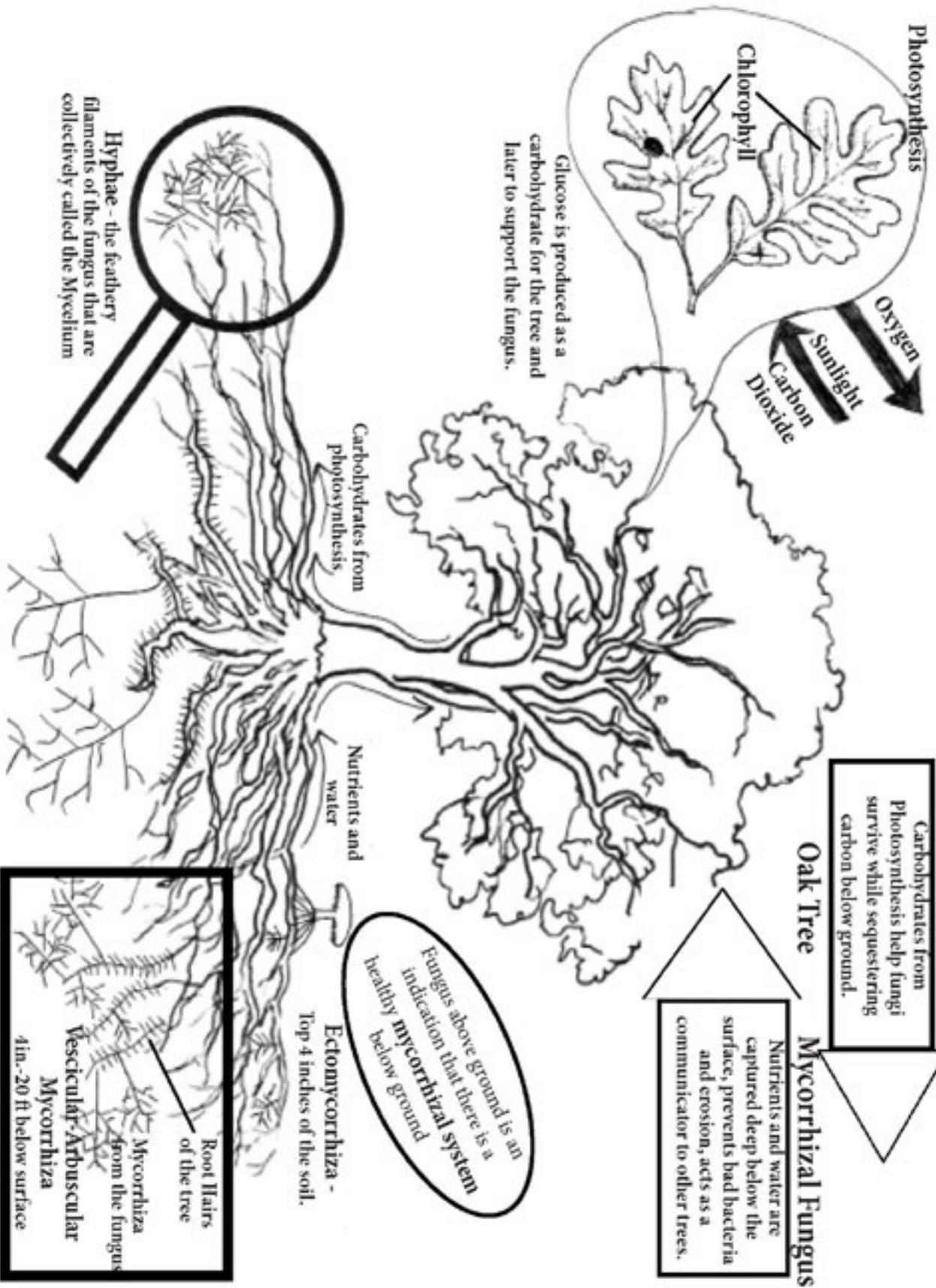
As you dig, do you notice anything around the root system that resemble Micorrhizae? They are like small white hairs that are growing in a mass. What is the soil like, compacted, loose, dark, light? Are there leaves and other decomposing matter? Do you see any mushrooms? Do you see anything that looks like mold or fungus under the ground? Do you think this soil is able to store water?

The presence of mushrooms around the base of a tree is a good sign that below ground there is an active Micorrhizal network of fungus.

Observations + Imagination

Using the visual of the Oak Tree Ecosystem (next page), imagine what the ecosystem of your tree looks like based on some of the observations you are making. Draw what you think it might look like on a separate sheet of paper!

Symbiosis of the Oak Tree and Mycorrhizal Fungus



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