

# Biodiversity – How it Stops Disease from Spreading!

## Essential Question:

*Why is biodiversity important?*

## Background Information:

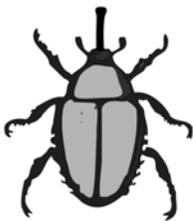
See: *Background Information for Garden Earth: Biodiversity Department*

## Getting Ready:

An area with enough space is needed to conduct this activity. You want the learners to be able to touch other surrounding learners; so don't let them distance themselves too much. Prepare the cards by copying the double-sided template onto colored paper and then cut the double-sided cards out.

## Procedure:

1. Have learners spread out in an area on the school site. Tell them that they are loblolly pine trees. In the mid to late 1800s land that had been used for cotton was left abandoned. Later loblolly trees were planted in this land. You are a forest of loblolly pines. You are a monoculture (all one species).
2. The loblolly pine is particularly susceptible to the southern pine beetle. Touch the nearest student to you. This student representing a loblolly tree has now been infected with the beetle.
3. Ask the student to reach out and touch the trees around her/him. The student should now sit down to represent a diseased/dead tree. The other infected trees should touch surrounding trees then sit down. This pattern will progress until all the trees are dead. Explain that because there is no biodiversity all the trees are susceptible to this beetle.
4. Distribute the Biodiversity tree cards to learners. Tell them to look at the side with the tree picture. Explain that they are all pine trees, but now they are different species of pine trees. There is a little more biodiversity among the trees.



5. Now explain that a certain type of weevil prefers eastern white pines to other pines and will readily infect these trees. Go to a student who is an eastern white pine and tell the student that they are now infected. They should reach around and touch surrounding trees. If any of the trees are eastern white pines then they should do the same and then sit down to show that they are diseased/dead. There is a good chance that not all the eastern white pines died. Because there are different species of pine tree present the weevil was not in the target range of all the susceptible trees.
6. Have the learners all stand up again. Explain that there is a fungal disease spreading through the forest. It is called fusiform rust and loblolly and slash pine are vulnerable. Introduce the disease (touch a student that has slash or loblolly card). They should then repeat the procedure of touching surrounding trees and sitting down. The infected slash and loblolly trees spread the disease to neighboring trees of the same species. Discuss the results, a lot of the trees may have died, maybe all of them, but only the loblolly and slash pine trees. There are still a lot of healthy pine trees in the forest.

Note: The fungus requires two living host trees, pine and oak, to complete its life cycle. The fungus cannot spread from pine to pine. Young oak leaves are infected in the spring by wind-borne spores produced on pine trees. The fungus does minimal damage to the oak leaves but later in the spring, wind-

**Location:** outside or inside

**Objectives:** *Learners will*

- 1) state 2 reasons why biodiversity is important.
- 2) describe an example of how biodiversity can stop the spread of disease.

**Skills:** analysis, listening, role-playing

**Supplies:**

- Biodiversity tree cards

**Subjects:** science

**Time:** 20 minutes

borne spores produced on the young oak leaves infect new pine growth. So, if simulating fusiform rust you cannot have pine tree student touching pine tree student. It has to be a pine tree student touched by an oak tree student.

7. Now the southern pine beetle invades. Some pine trees have a higher resistance to the beetle, but all are susceptible to a certain degree. Touch one student to represent infection. The infection will spread through all the trees. The trees should all die. Discuss with learners – even though we have some biodiversity the forest is still very vulnerable. What could we do to improve this forest?
8. Ask learners to turn over their cards. They are now representing a much more diverse forest – much more similar to an old growth forest. You can also talk with the learners about the life that the forests support – you will have much more diversity in the organisms living in the forest with different tree types. Now introduce the White Pine weevil to an eastern white pine – only that tree or maybe another one will die.
9. Introduce the fusiform to a slash or loblolly and there should be a reduction in infected trees because of the increased tree diversity. Even if all the trees of that type died there would still be a lot of other tree types in the forest. Lastly introduce the pine bark beetle. It should be contained and not all the pines will die. A high biodiversity means a healthy ecosystem.

**Discussion/Assessment:**

What does biodiversity mean?

Why didn't all the trees get infected? (Different genes)

If you cut down forest on your land, then replant only one type of tree, how would this affect the wildlife that was adapted to that forest? (Rest of forest could be at carrying capacity – will not be able to support all this extra wildlife)

Give an example of a monoculture in your home or on a farm. (Lawn/wheat/corn)

Are there any advantages to monoculture? (Increased food production)

You need to allow kids to think for themselves about the advantages and disadvantages.