

**Lesson Title:** A Link between the Pine Bush and the Nitrogen Cycle

**Lesson Abstract:** Students will apply their knowledge of the Nitrogen Cycle to a specific ecosystem.

**Length of lesson:** 20 min

**Lesson Goals:** Students will gain a better understand apply their knowledge to real world situations.

**Lesson Objectives:** SWBAT predict consequences of human action on an ecosystem

**Assessment of Objectives:** Students will write an essay, and present and defend their ideas

**Preparation:** Copy of Reading

**Materials:** none

**Background Information:** Lesson on Nitrogen Cycle.

Lesson Plan:

QA How do plants affect the nitrogen cycle? Can humans affect the nitrogen cycle?

Supervised Read the handout about Black Locust and the Pine Bush. Answer the following questions:

1. How do both bacteria and Black Locust benefit from their relationship?
2. How can plants be used to alter the soil of an ecosystem?
3. Are human interventions like the ones mentioned in the handout a good way to help to restore ecosystems? Defend your answer.

Discussion Have students report and analyze each other's answers.

Closure How is this issue related to the Blue lupine and succession

## Ecology – A link between the Pine Bush and the Nitrogen Cycle

The Black Locust is an invasive tree in the Pine Bush. It is a member of the pea family and has a mutualistic relationship with nitrogen fixing bacteria that live in nodules on its roots. Because of its ability to add nitrogen to the soil it has an advantage over other plants in the nutrient poor sandy soils of the Pine Bush.

When Black Locust was mechanically removed from an area in the Pine Bush it was found that other invasives such as grasses and weeds did well in the areas it had left. Studies by Dr. Steven Rice from Union College showed that there was still extra nitrogen in the soil left by the Black Locust. One solution was to add mulch to the area, which reduces nitrogen availability, before replanting an area with native plants.



Tree



Leaves



Thorns



Flowers



Tree



Seed

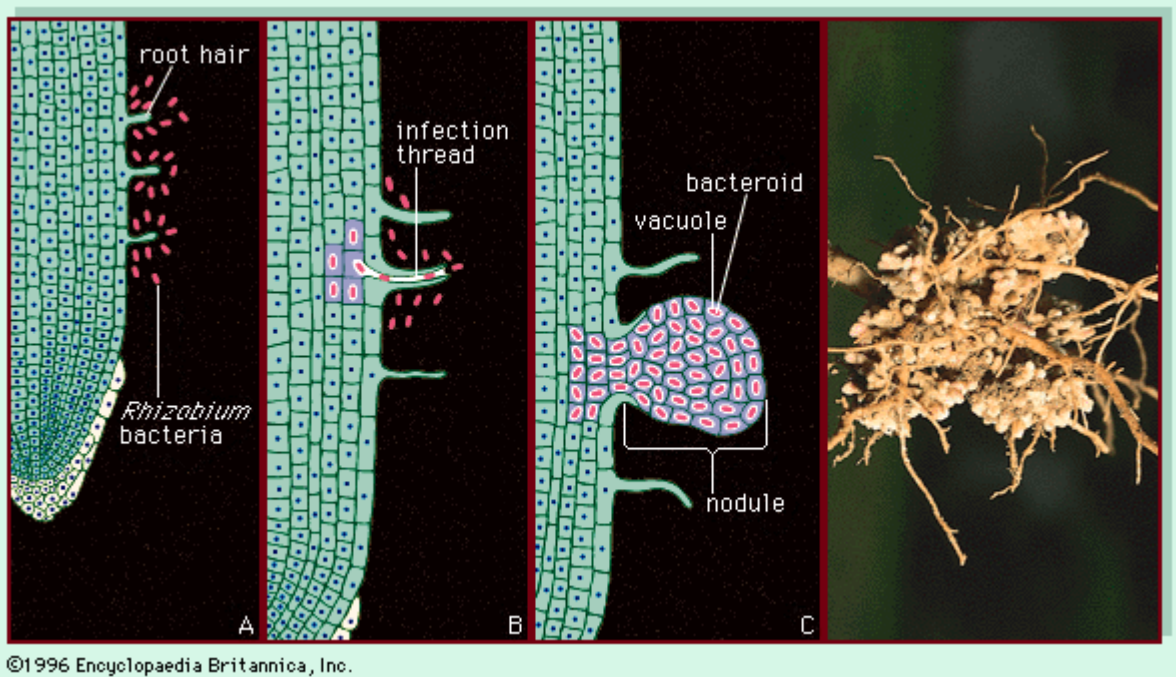


Clone in Pine Bush



Range

The mutualistic relationship between bacteria and some plant roots



Nodules on roots



Microscopic view