

EPICORMIC SPROUTING IN PITCH PINES

PLANTS RESPOND TO STIMULI

OVERVIEW

Albany Pine Bush Preserve Commission Educators have prepared this document as a resource for teachers. Here, we present a phenomenon and related materials available through the Albany Pine Bush Preserve website and relate them to a specific learning standard. Teachers are welcome to use these materials for objectives not encompassed by the learning standard listed and are encouraged to contact the Albany Pine Bush Preserve Commission with questions, ideas, and feedback.

NYS NEXT GENERATION SCIENCE LEARNING STANDARD

MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior and/or storage as memories

CORE IDEA

LS1.D: Information Processing

- (NYSED) Plants respond to stimuli such as gravity (geotropism) and light (phototropism)

BACKGROUND

THE ORGANISM

Pitch pines (*Pinus rigida*) are coniferous, evergreen trees. They are the dominant tree species in the inland pitch pine-scrub oak barrens of the Albany Pine Bush Preserve. Pitch pines have highly variable growth forms and are unusual among conifers for their ability to grow new shoots and branches from dormant buds on their trunks and branches. These dormant buds are called “epicormic buds.”

THE SITE

The Albany Pine Bush Preserve is approximately 3,500 acres of land between the cities of Albany and Schenectady. This land has been protected from development because of its unusual geology and the globally rare communities of plants and animals it supports. The Albany Pine Bush Preserve is managed by the Albany Pine Bush Preserve Commission staff. The most important management technique used in the preserve is prescribed fire. Fire is a type of natural disturbance that is important to maintaining many ecological communities. Without fire, the rare inland pine barrens would become overgrown and turn into forests. Prescribed fires are different from wildfires, because they are intentionally set and carefully controlled and contained by trained professionals and volunteers.

ASSIGNMENT OPTION

Explain how the photographs and information provided are evidence that sensory receptors in pitch pine trees respond to stimuli, resulting in changes in the plants behavior.

PHOTOGRAPHS

AN EPICORMIC SPROUT

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PITCH PINE TREES IN AN AREA THAT HAS NOT EXPERIENCED FIRE IN A LONG TIME

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PITCH PINE TREES TWO YEARS AFTER A PRESCRIBED FIRE

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BEFORE AND AFTER PHOTO SERIES OF AN AREA OF THE ALBANY PINE BUSH THAT WAS BURNED

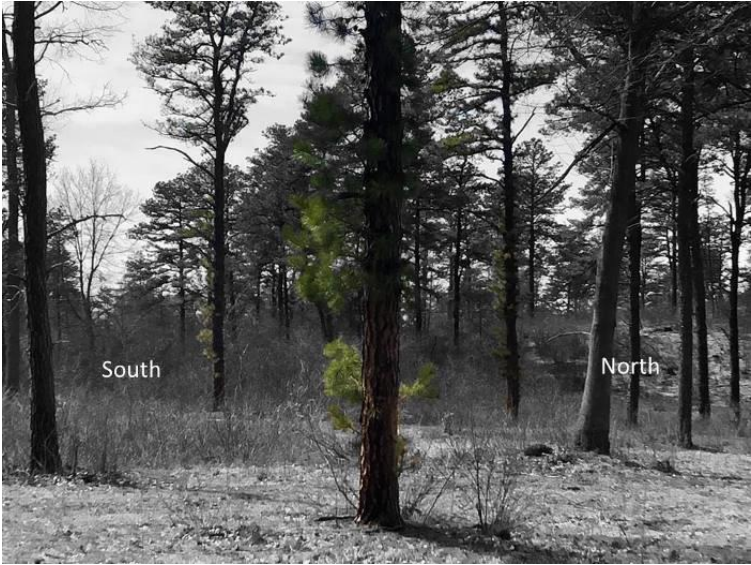
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EPICORMIC SPROUTS ON TREES GROWING IN THE OPEN WITH NORTH AND SOUTH FACING SIDES LABELED

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OBSERVATIONS

- The pitch pines in the photographs where there has not been a prescribed fire do not have epicormic sprouts.
- The pitch pines in the photograph where there has been a prescribed fire do have epicormic sprouts.
- The epicormic sprouts on the south-facing side of the pitch pine trees are longer and more numerous than the epicormic sprouts on the north-facing side of the tree.

DISCUSSION TOPICS

- Needles are the pitch pine's leaves. Photosynthesis is an important process that takes place in the leaves of plants. What do the leaves do for the plant? What do the leaves need in order to do this?
- The location of these trees is approximately 43 degrees north latitude. What does this mean about the direction of the sun's rays as they strike the trees? Are the rays coming slightly more from the north or from the south?
- Why would it be beneficial to the trees to cover their trunks with new leaves after a fire?
- Why would it not be beneficial for trees growing in a dense forest to cover their trunks with leaves?
- Some trees that experienced a prescribed fire have not started growing epicormic sprouts. Does this

ARGUMENT

These photographs provide evidence that something about the fire may cause the pitch pine trees to grow epicormic sprouts. By the second year following a prescribed fire, many pitch pine trees have grown epicormic sprouts on their trunks and branches, whereas trees growing in an area that has not been burned do not have epicormic sprouts. Possible stimuli related to the fire that may have caused the epicormic sprouts to grow include heat or injury from the fire, or changes in nutrient availability or more sunlight striking the lower parts of the trees after the fire. The photographs that show more epicormic growth on the south-facing side of the trees are evidence that the trees' epicormic sprout growth responds to sunlight. In the northern hemisphere, so the south-facing side of trees growing in the open receive more direct sunlight than the north-facing side. Taken together, these photographs are evidence that the pitch pine trees are responding to environmental stimuli by growing epicormic sprouts.