



El Dorado County Career Technical Partnership

In Partnership: Folsom Lake College • El Dorado Union High School District • El Dorado County Office of Education

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Title: Genetic Study of White Pine Blister Rust Resistance Part 1		
Content Area: Biological Sciences	Grade: 11-12	Duration: Two 1-hour periods
Career Technical Industry Sector: United States Forest Service Nursery Camino, CA	X	Agriculture and Natural Resources
		Hospitality, Tourism, and Recreation
Standards and Benchmarks:	<p>Biology/Life Science</p> <p>3.a</p> <p>Students know how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and the mode of inheritance (autosomal or X-linked, dominant or recessive).</p> <p>Agriculture and Natural Resources Industry Sector Career Pathways</p> <p>E 10.0</p> <p>Students Understand forest management practices</p> <p>E 10.6</p> <p>Understand how to identify and diagnose damage from destructive insects, diseases, and weather, and know methods for their management</p>	
Objectives:	<ol style="list-style-type: none"> 1. Students will know that there are certain white pines that have a natural genetic resistance to Whit Pine Blister Rust. 2. Students will use a punnett square to determine the percentage of White Pine Blister Rust disease resistance in resulting offspring. 3. Students will understand how to identify and diagnose damage from White Pine Blister Rust and know methods for its management. 	
Resources and Materials:	<p><u>Tree Notes</u> http://ceres.ca.gov/foreststeward/pdf/treenote27.pdf</p> <p>Punnett Square Worksheet</p> <p>Understanding Punnett Squares PowerPoint</p> <p>Managing for Healthy White Pine Ecosystems in the United States to Reduce the Impacts of White Pine Blister Rust (USDA Forest Service September 2003).</p>	
Differentiation:		



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<p>Preparing Students for the Lesson:</p> <ul style="list-style-type: none"> • Transitions • Expected Behaviors 	<p>Transition: Students will move quietly and quickly to a computer in the classroom. Two or three students may need to share a computer. The computers should be turned on and logged-in in advance to facilitate quickly moving to the activity.</p>
<p>Teaching the Lesson (Lesson Sequence/ Activities):</p> <ul style="list-style-type: none"> • Motivation/ Anticipatory Set • Pre-Assessment/ Activating • Background Knowledge • Teacher Input, Modeling, & Checking for Understanding • Guided Practice • Independent Practice • Closure 	<p>Lesson Sequence: This lesson can be used as a stand-alone independent study lesson.</p> <p>Students will move to a computer and open the PowerPoint presentation on Punnett Squares. After viewing the PowerPoint presentation the students will complete the Punnett Square Worksheet.</p> <p>Students will review selected material from the pamphlet, <u>Managing for Healthy White Pine Ecosystems in the United States to Reduce the Impacts of White Pine Blister Rust</u> to better understand the problems related to white pine blister rust.</p> <p>Students will review Tree Notes website for additional information.</p> <p>Background Knowledge: White pine blister rust, caused by the fungus <i>Cronartium ribicola</i>, is a disease of 5-needle pines (white pines) and its alternate host <i>Ribes</i> (currants and goose - berries). The fungus is an invasive, exotic pathogen native to Eurasia. White pine blister rust has come to be recognized as one of the most catastrophic plant disease epidemics in history.</p> <p>White pine blister rust requires two hosts (white pine and <i>Ribes</i>) in order to survive.</p> <p>Some white pines have a natural resistance to blister rust. The seeds from these trees are gathered and bred to create stock to be planted in blister rust infested forests.</p> <p>Forest management on the emphasis of the white pine blister rust control has shifted from direct control (pruning pine branches, eradicating <i>Ribes</i>, etc.) to genetic screening of planting stock for rust resistance.</p>



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	<p>Independent Practice:</p> <p>Students will review all material above.</p> <p>Students will complete Punnett Square worksheet.</p> <p>Students will write a short informational essay on the effects and control of white pine blister rust focusing on genetic screening and planting stock for rust resistance.</p>
Assessment:	See attached Rubric.
Notes & Reflections:	Students should come away from this lesson knowing that white pine blister rust is a very destructive plant disease that is considered an epidemic. They should also understand that it takes two hosts, the white pine and the <i>Ribes</i> (currants and gooseberries) in order to survive.

Externship Sites:	USFS Nursery, Placerville, CA		
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