### NATIONAL SCIENCE EDUCATION STANDARDS

#### Grades 9-12

<table>
<thead>
<tr>
<th>Content Standard A: Science as Inquiry</th>
<th>Corresponding Arabidopsis Activities</th>
<th>Student learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abilities necessary to do scientific inquiry</td>
<td>Plant in Jar Arabidopsis research Accurate Measuring Watching Germination Water Requirements Why have Roots? Surface of Leaf/Transpiring Plants What’s in a Flower?</td>
<td>• Students test their ideas about the plant in a jar • Students design and test their hypotheses about environmental conditions that may affect the growth of their plants • Students use appropriate techniques to measure accurately and analyze the results • Students make observations and research information • Students make predictions.</td>
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<tr>
<td>Understanding scientific inquiry</td>
<td>Plant in a Jar Arabidopsis research Accurate Measuring Watching Germination Water Requirements</td>
<td>• Students re-develop their framework of understanding based on the results of ‘Plant in a Jar’ • Through students’ design of research projects, all aspects of scientific inquiry are covered • Students use appropriate techniques to measure accurately and analyze the results • Students have opportunities to ask new questions and develop new ideas.</td>
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<tr>
<td>Grades 9-12 Content Standard C: Life Science</td>
<td>Corresponding Arabidopsis Activities</td>
<td>Student learning</td>
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<td>The cell</td>
<td>Transpiring Plants&lt;br&gt;What’s in a Flower?</td>
<td>• Students observe specialized cell structures (stomata, pollen, etc.) that correspond to specific functions</td>
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<tr>
<td>Molecular basis of heredity</td>
<td>Arabidopsis research</td>
<td>• Students compare wild-type and mutant plants that differ only in one gene&lt;br&gt;• Students determine that changes in genotype may or may not lead to changes in phenotype</td>
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<tr>
<td>Biological evolution</td>
<td>Arabidopsis research</td>
<td>• Students examine different plant mutants for specific environmental tolerances</td>
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<td>Interdependence of organisms</td>
<td>Plant in a Jar</td>
<td>• Students observe interdependence of organisms in this closed environment</td>
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<tr>
<td>Matter, energy, and organization in living systems</td>
<td>Watching Germination&lt;br&gt;Water Requirements&lt;br&gt;Water through the Stem&lt;br&gt;Transpiring Plants&lt;br&gt;What’s in a Flower?</td>
<td>• Students observe different tissue organization based on function&lt;br&gt;• Students observe that matter moves through a plant&lt;br&gt;• Students observe and measure amounts of transpired water and relate them to leaf surface area&lt;br&gt;• Students observe how energy is transferred to offspring</td>
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<tr>
<td>Behavior of organisms</td>
<td>Arabidopsis research</td>
<td>• Students observe and record plant responses to environmental stimuli</td>
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### NATIONAL SCIENCE EDUCATION STANDARDS

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<tr>
<th>Grades 9-12</th>
<th>Content Standard F: Science in Personal and Social Perspective</th>
<th>Corresponding Arabidopsis Activities</th>
<th>Student learning</th>
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<tbody>
<tr>
<td>Personal and community health</td>
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</table>
| Population growth | Arabidopsis research Plant in a Jar | | • Students thin plants as they grow, according to the limitations of the environment  
• Students observe that environments have a limited capacity for sustaining populations |
| Natural Resources | Arabidopsis research | | • Students design experiments, determining what resources are available for plant use |
| Environmental Quality | Arabidopsis research | | • Students compare plant growth under different environmental conditions |
| Natural and human induced hazards | Arabidopsis research | | • Students test the effects of environmental changes on the survival and growth of plants |
| Science and technology in local, national, and global challenges | | | |
### NATIONAL SCIENCE EDUCATION STANDARDS

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<tr>
<th>Grades 9-12 Content Standard G: History and Nature of Science</th>
<th>Corresponding Arabidopsis Activities</th>
<th>Student learning</th>
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</table>
| Science as a human endeavor                                  | *Arabidopsis* research               | • Students peer review the work of others  
• Students work in pairs or groups to design and conduct research projects  
• Scientists provide advice and materials to students designing and conducting experiments; students provide data and research reports back to scientists |
| Nature of scientific knowledge                               | Plant in a Jar  
*Arabidopsis* research  
Watching Germination  
Water Requirements  
Why have Roots? | • Students forced to rethink their ideas based on the results of ‘Plant in a Jar’  
• Value is placed on students’ work on *Arabidopsis* research  
• Students observe that explanations can be developed and derived through experimentation  
• Students see the importance of accurate and thorough observations |
| Historical perspectives                                       |                                      |                 |