**Instructional Recipe**

**What are the Advantages and Disadvantages of Using Pesticides?**
High School - Environmental Systems

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**Step 1 – Ask**

**Objectives:** Students will examine the effects of pesticides on people, plants and animals. They will discuss the purposes of the use of pesticides. Finally, they will predict the result of the elimination of pesticides and propose alternatives.

**Introduction:** According to historians, pesticides have been used since 500 BC to protect people’s crops. In the mid 20th Century, DDT revolutionized agricultural practices due to its high effectiveness. However, it was later banned due to significant adverse effects in the environment. It is estimated that today, about 13% of produce in the U.S contains some level of harmful pesticides. In some developing countries, pesticide poisoning causes more deaths than infectious diseases. In spite of efforts by the United Nations Food and Agriculture Organization (FAO) to restrict the use of harmful pesticides and encourage safer agricultural practices, thousands of deaths are still reported.

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**Ask:**

- What chemicals are used as pesticides?
- How much, how often and where are they used?
- How do they affect humans, plants and animals?
- How do they affect the water and food supply?
- What are the benefits of using pesticides?
- What can be used in place of pesticides?
Step 2 – Investigate

K-12 Databases resources:

★ Pesticide poisoning in the developing world--a minimum pesticides list. By: Eddleston, Michael; Karalliedde, Lakshman; Buckley, Nick; Fernando, Ravindra; Hutchinson, Gerard; Isbister, Geoff; Konradsen, Flemming; Murray, Douglas; Piola, Juan Carlos; Senanayake, Nimal; Sheriff, Rezvi; Singh, Surjit; Siwach, S B; Smit, Lidwien. Lancet, 10/12/2002, Vol. 360 Issue 9340, p1163; Aug 30, 2009 (AN 7501302)

Additional Websites:

• U.S. Environmental Protection Agency – Pesticides <http://www.epa.gov/opp00001/about/>
• Texas Department of Agriculture – Pesticide Programs http://www.agr.state.tx.us/agr/program_render/0,1987,1848_5319_0_0,00.html?channelId=5319

Book: Silent Spring by Rachel Carson

Step 3 – Create

Students will create an idea web that shows the benefits and consequences of pesticides, and the benefits and consequences of organic farming. Students will compare and contrast both lists of findings.

*Technology Link - Students will organize the information using graphic organizers such as Inspiration, Webspiration or Bubbl.us.
Step 4 – Discuss

Students will be given the choice of one or more of the following end projects:

- You have been hired as a lawyer to defend a rural community who has shown diseases believed to be the result of the use of a particular pesticide that has contaminated the water source. Together with an investigative reporter, community doctor, chemical engineer and witnesses, present your case to the city government. Support your case with evidence you will have previously collected.

- Prepare for a debate and present the pros and cons of the use of pesticides.

- Investigate the reasons why some pesticides have been banned while others are still in use. Present your findings and share your thoughts.

- Start an organic community garden in your area and maintain it over an extended period of time. Explain the challenges encountered as a result of eliminating chemical pesticides, the solutions to these situations, and the positive and negative results.

*Technology Link* – Students may use multimedia to present their evidence, document results and support their positions.

Step 5 – Reflect

Allow students to present their projects to the rest of the class. Use the following suggested rubric to assess the students’ work. Make sure that the students are familiar with the rubric before they begin creating their project. They should refer to the rubric repeatedly to monitor their progress in creating their project.

*Technology Link:* You can also create your own rubric with your students at [http://rubistar.4teachers.org/index.php](http://rubistar.4teachers.org/index.php).
## Rubric
### Debate

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opening &amp; Closing Statements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Thorough, well-organized presentation of arguments and evidence. Opening statement engages the interest of audience. Closing statement leaves no unanswered issues and resonates with the audience.</td>
<td>Organized and generally complete presentation of arguments and evidence. Opening statement outlines arguments and evidence but does not generate interest. Closing statement does not reflect remarks made during debate.</td>
<td>Somewhat organized presentation of arguments and evidence. Opening statement minimally outlines arguments. Closing argument briefly restates the ideas offered in the opening statement.</td>
<td>Arguments are unorganized, incomplete, or lacking in evidence. Opening statement and closing statements do little more than state the position of the team.</td>
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<tr>
<td><strong>Rebuttals</strong></td>
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<tr>
<td>Responds to issues raised by opponents with concise, accurate, logical answers.</td>
<td>Responds to most of the issues raised by opponents with generally accurate answers.</td>
<td>Seems to be caught off-guard by opponent; offers tentative, somewhat accurate, but possibly vague or illogical responses.</td>
<td>Is unable to respond to issues raised by opponents in a meaningful or accurate way.</td>
<td></td>
</tr>
<tr>
<td><strong>Effective use of historical evidence / content knowledge</strong></td>
<td></td>
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<tr>
<td>Demonstrates a sophisticated understanding of the issues, events and facts relevant to the topic; makes original connections and interpretations.</td>
<td>Demonstrates a basic and accurate understanding of the issues, events and facts relevant to the topic; makes basic connections between facts and concepts.</td>
<td>Demonstrates a generally accurate understanding of relevant issues, events and facts, but may exhibit minor confusion or misunderstandings.</td>
<td>Demonstrates an inadequate understanding of the history content relevant to the topic.</td>
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</tr>
<tr>
<td><strong>Language Use</strong></td>
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<tr>
<td>Uses language that is stylistically sophisticated and appropriate.</td>
<td>Uses language that is appropriate.</td>
<td>Generally uses language that is appropriate.</td>
<td>Uses colloquial, overly simplistic language.</td>
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<tr>
<td><strong>Performance</strong></td>
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</tbody>
</table>
# Rubric
## Use of Multimedia

<table>
<thead>
<tr>
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<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td><strong>Accuracy of information</strong></td>
<td>Student accurately describes the problem, its causes and consequences.</td>
<td>Student accurately describes most causes and consequences of the use of pesticides.</td>
<td>Student accurately describes some causes and consequences of the use of pesticides.</td>
<td>Student describes only a few causes and consequences of the use of pesticides.</td>
</tr>
<tr>
<td><strong>Persuasiveness</strong></td>
<td>Student provides numerous convincing reasons and steps to reduce impact on humans and the environment.</td>
<td>Student provides several convincing reasons and steps to reduce impact on humans and the environment.</td>
<td>Student provides only few convincing reasons or steps to reduce impact on humans and the environment.</td>
<td>Student does not provide any convincing reasons to reduce impact on humans and the environment.</td>
</tr>
<tr>
<td><strong>Creativity</strong></td>
<td>The student includes many creative elements in the presentation.</td>
<td>The student includes some creative elements in the presentation.</td>
<td>The student includes very little creative elements in the presentation.</td>
<td>The presentation lacks any creative elements.</td>
</tr>
<tr>
<td><strong>Delivery of Presentation</strong></td>
<td>Student delivers the presentation with enthusiasm and fluency. Student has obviously practiced for the presentation.</td>
<td>Student delivers the presentation with enthusiasm and fluency. Student has obviously rehearsed for the presentation, although he or she may make a few minor mistakes.</td>
<td>Student struggles with the delivery of the presentation, but the information is still easily understood by the audience.</td>
<td>Student struggles with the delivery of the presentation, making it difficult for the audience to hear or understand the information.</td>
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</tbody>
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