

## PEST AND PESTICIDE MANAGEMENT

### Performance Standards 13A/11A/12C/13B.I

Students will apply the accepted practices of science in the context of the changes in scientific knowledge over time in the research and development of agricultural pesticides accordingly:

- *Knowledge*: understand the basic chemical and biological properties of agricultural pesticides.
- *Application*: research examples of the progression and effects of the improvements from agricultural pesticide research.
- *Communication*: compare research on the evolution of agricultural pesticides and the impact of the changes on society.

### Procedures

1. ***In order to know and apply accepted practices of science (13A); concepts that describe properties of matter and energy and the interactions between them (12C); the concepts, principles and processes of scientific inquiry (11A); and concepts that describe the interaction between science, technology and society (13B)***, students should experience sufficient learning opportunities to develop the following:
  - Formulate hypothesis for research to correlate changes in agricultural pesticides and associated societal applications (certification requirements, purchasing approval, etc.).
  - Propose options for appropriate questions and procedural steps.
  - Reference pertinent research associated with the development, handling, storage, etc., of agricultural pesticides on issues or topics such as:
    - personal and environmental safety policies for storage, handling and disposal of pesticides,
    - risk/benefit studies for hazardous organic and inorganic pesticide chemicals,
    - pesticide persistence in the environment,
    - disposal procedures for pesticides, their containers and residues, etc.,
    - hazardous waste pick-up programs organized by the Illinois Environmental Protection Agency,
    - federal programs for development and enforcement of environmental safety policies,
    - genetic modifications or acquired resistance issues for specific plants or pests and
    - pesticide effectiveness in controlling pest populations.
  - Investigate specific settings in which agricultural pesticide regulations or occupational decisions about their use reflect changes:
    - in scientific knowledge such as tolerances for safety or chemical or biological effects,
    - in technological capabilities such as handling, storage or disposal procedures or
    - in public opinion such as potential damage in non-agricultural settings.
  - Demonstrate how scientific conclusions are open to modification as new data are collected.

Note to teacher: This activity relates to knowledge associated with Standards 13A and 12C, while addressing the Performance Descriptors for Stage I within Standard 11A. The interaction between science, technology and its societal context (13B) may be used as an introductory or culminating activity. Agriculture students need to be aware of the proper use and storage of agricultural pesticides, the regulations regarding crops with built-in pest resistance and the history of how and why pesticides have changed and will change over time. This knowledge will serve students well as future employees in the agricultural industry and as homeowners. This assessment aligns with the Illinois Workplace Skills D1 (Communicating on the Job/Communicate orally with others), D4 (Communicating on the Job/Prepare written communication), I1 (Maintaining a Safe and Healthy Work Environment/Identify safety and health rules/procedures), I3 (Maintaining a Safe and Healthy Work Environment/Identify conservation and environmental practices and policies), and I6 (Maintaining a Safe and Healthy Work Environment/Identify hazardous substances in the workplace).
2. Have students review and discuss the assessment task and how the rubric will be used to evaluate their work.
3. Set the stage for this activity by explaining some of the regulations that face agribusinesses involved in production agriculture in their handling of agricultural pesticides and compliance to the Worker Protection Standard (WPS). The WPS law is a set of rules designed to reduce the number of pesticide-related illnesses. The rules do not regulate or ban any chemical; they provide guidelines for workers to follow during and after application. Ask students to offer examples of guidelines that may be included in the Worker Protection Standard such as restricted entry interval. In addition ask students to offer examples of the regulatory policies

for safe storage, handling and disposal of chemicals. They should be familiar with current genetically modified plants that have built-in protection to specific insects, such as Bt corn, and continued efforts to develop plants more resistant to pests by utilizing natural means. Assign individual research to investigate methods used by those involved in crop production to reduce the environmental impacts of using pesticides, the economic benefits of using pesticides, the benefits of utilizing crops with built-in pest resistance, the disadvantages of utilizing crops with built-in pest resistance and society's acceptance of genetically modified crops in the food supply. Students should present their research findings with appropriate mapping, graphic display and timeliness for class discussion. Additional topics to be considered include how the changes in technology came about, influences which interacted in the change, parallels with other cultural or society developments, public opinion responses, consumer demands or legislative regulations. In addition to individual research, students should reflect on the common denominators about the changing responses from science and the public in the face of new information, as well as the political and economic ramifications.

4. Evaluate each student's work using the Science Rubric as follows, and add the scores to determine the performance level:

- *Knowledge*: An overview of the basic chemical and biological properties of agricultural pesticides was complete, detailed and accurate.
- *Application*: The research on the progression and effects of the improvements from agricultural research was complete and correct.
- *Communication*: The comparative factors about the evolution of the changes and impact were insightful and accurate.

#### **Examples of Student Work**

- [Meets](#)
- [Exceeds](#)

#### **Time Requirements**

- One-to-two days for classroom introductory sessions
- One-to-two weeks for individual research
- One week for research presentations and comparative discussions

#### **Resources**

- Worker Protection Standard  
<http://www.epa.gov/oppfead1/safety/workers/princip.html>
- Science Rubric

## SCIENCE RUBRIC

Exceeds - must receive no more than one 3 and the rest 4s in the other areas of the rubric.

Meets - may receive no more than one 2 and a combination of 3s and 4s in the other areas of the rubric.

Approaches - may receive no more than one 1 and a combination of 2s, 3s or 4s, in the other areas of the rubric.

Begins - must receive at least a 1 in all 3 areas of the rubric.

	<b>KNOWLEDGE</b>	<b>APPLICATION</b>	<b>COMMUNICATION</b>
	Knows and understands scientific terms, facts, concepts, principles, theories and methods.	Applies scientific knowledge, skills and methods to manipulate, analyze, synthesize, create and evaluate.	Communicates scientific knowledge and applications through writing, speech and visual displays.
<b>4</b>	<ul style="list-style-type: none"> <li>• Descriptions of scientific terms, facts, concepts, principles, theories and methods are complete and correct.</li> </ul>	<ul style="list-style-type: none"> <li>• Applications are thorough, appropriate and accurate.</li> </ul>	<ul style="list-style-type: none"> <li>• Written, oral and/or visual communication is well organized and effective.</li> </ul>
<b>3</b>	<ul style="list-style-type: none"> <li>• Descriptions of scientific terms, facts, concepts, principles, theories and methods are mostly complete and correct.</li> </ul>	<ul style="list-style-type: none"> <li>• Applications are mostly thorough, appropriate and accurate.</li> </ul>	<ul style="list-style-type: none"> <li>• Most of the written, oral and/or visual communication is well organized and effective.</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>• Descriptions of scientific terms, facts, concepts, principles, theories and methods are somewhat complete and correct.</li> </ul>	<ul style="list-style-type: none"> <li>• Applications are somewhat appropriate and accurate.</li> </ul>	<ul style="list-style-type: none"> <li>• Some of the written, oral and/or visual communication is organized and effective.</li> </ul>
<b>1</b>	<ul style="list-style-type: none"> <li>• Descriptions of scientific terms, facts, concepts, principles, theories and methods are minimally present or correct.</li> </ul>	<ul style="list-style-type: none"> <li>• Applications are minimally appropriate and accurate.</li> </ul>	<ul style="list-style-type: none"> <li>• Little of the written, oral and/or visual communication is organized and effective.</li> </ul>
<b>0</b>	<ul style="list-style-type: none"> <li>• All descriptions of scientific terms, facts, concepts, principles, theories and methods are missing and/or incorrect.</li> </ul>	<ul style="list-style-type: none"> <li>• All applications are missing and/or incorrect.</li> </ul>	<ul style="list-style-type: none"> <li>• All of the written, oral or visual communication is missing and/or lacks organization.</li> </ul>
<b>Score</b>			