

AGRICULTURAL SAFETY KNOWLEDGE BASE CHANGES

Performance Standards 13A/12C/11A.I OR 13A/12C/11A.J

Students will apply the accepted practices of science in the context of agricultural safety policies and the changes in scientific knowledge over time accordingly:

- *Knowledge*: understand how regulatory policies based on scientific research about agricultural chemicals have changed over time.
- *Application*: research examples of the impact of the changes in safety regulations and accepted practices of science.
- *Communication*: compare research on the evolution of agricultural science safety regulatory changes and the impact of the changes on society.

Procedures

1. ***In order to know and apply the accepted practices of science (13A); concepts that describe properties of matter and energy and the interactions between them (12C); and the concepts, principles and processes of scientific inquiry (11A)***, students should experience sufficient learning opportunities to develop the following:
 - Formulate hypothesis for class investigations to correlate changing agricultural safety regulations associated with potentially hazardous chemicals in real-world societal situations. (This can be in the form of a scientific inquiry for Stage I or as an issue investigation for Stage J.)
 - Propose options for appropriate questions and procedural steps for investigating the physical and chemical properties of chemicals according to their intended (and unintended) uses in an agricultural or horticultural setting. (These investigations may examine factors that affect capacity to react or rates of reactions.)
 - Reference pertinent research associated safety regulations, procedures and applications:
 - procedures and policies to eliminate or reduce risk in potentially hazardous activities,
 - citing federal or state agency requirements for safety regulations (and certification) for employees for safety regulations,
 - personal and environmental safety policies for storage, handling and disposal of agricultural chemicals,
 - risk/benefit studies for hazardous organic and inorganic agricultural chemicals,
 - local and community disposal procedures for hazardous materials (such as paints, insecticides, herbicides, greenhouse chemicals, etc.),
 - household waste and hazardous waste pick-up programs organized by the Illinois Environmental Protection Agency and
 - federal programs for development and enforcement of environmental safety policies.
 - Investigate specific settings at which these regulations reflect changes:
 - in scientific knowledge and tolerances for safety,
 - in technological capabilities,
 - in public opinion and/or
 - in cultural developments.
 - Demonstrate how scientific conclusions are open to modification as new data are collected.

Note to teachers: This activity relates to knowledge associated with Standards 13A and 12C, while addressing the Performance Descriptors for Stage I within Standard 11A. The societal context of implementing safety regulations about hazardous chemicals may be used as an introductory or culminating activity. Agriculture/horticulture students regularly study safe storage, handling and disposal of chemicals in the context of safe handling of fertilizers, soil *applications*, paints, insecticides, herbicides, pesticides and greenhouse chemicals, such as growth inhibitors, growth stimulators, bug bombs, root-rot chemicals, etc. Since agricultural research is ongoing, government regulations are continually changing. Agriculture/horticulture students are all aware of the dangers of any chemical regardless of where it is used: in the home, on the farm (livestock, buildings or crops), in the greenhouse or commercially. This assignment aligns with the Illinois Workplace Skills I.1 (Maintaining a Safe and Healthy Work Environment/Identify safety and health rules/procedures), I.4 (Maintaining a Safe and Healthy Work Environment/Act during emergencies), I.6 (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 asking students to offer examples associated with the regulatory policies for safe storage, handling and disposal of agricultural/horticultural chemicals. They may be familiar with current efforts to define (or redefine) tolerances or certification requirements for purchase and application of restricted chemicals or the disposal of lead batteries, household paints, unused or unwanted chemicals or containers, etc. Create a listing of such settings and regulations. Stress that the definitions of safety tolerances may have changed over time and will continue as more information and technologies are researched and developed. Questions may arise about the regulations that farmers, horticulturalists, agricultural business owners and employees face for the handling of chemicals, the clean-up of spills, etc. Assign individual research to investigate the explanation of a product or regulation. This may include historical setting, chemical hazard potential, economic costs for use/clean-up/disposal, plant/animal physiological tolerances, industrial utility and societal impact for specific hazards, locales or policy decisions, etc. Students should present their research findings with appropriate mapping, graphic display and timelines for class discussion. Additional topics to be considered include how the changes in tolerance 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 political and economic ramifications. An issue investigation at Stage J can extend thinking about the statement: Should the agricultural safety knowledge base change? Why? and Why not? Resistance to changing regulations and certification requirements can be addressed more objectively from research about this question.
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 changes in agricultural regulatory policies and chemical research was complete, detailed and accurate.
 - *Application*: The research on the societal impact of an agricultural product or policy was complete and correct.
 - *Communication*: The comparative factors about the research changes and societal 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

- Science Rubric
- Access to current and historical agricultural research and policy resources

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.

	KNOWLEDGE	APPLICATION	COMMUNICATION
	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.
4	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are complete and correct. 	<ul style="list-style-type: none"> • Applications are thorough, appropriate and accurate. 	<ul style="list-style-type: none"> • Written, oral and/or visual communication is well organized and effective.
3	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are mostly complete and correct. 	<ul style="list-style-type: none"> • Applications are mostly thorough, appropriate and accurate. 	<ul style="list-style-type: none"> • Most of the written, oral and/or visual communication is well organized and effective.
2	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are somewhat complete and correct. 	<ul style="list-style-type: none"> • Applications are somewhat appropriate and accurate. 	<ul style="list-style-type: none"> • Some of the written, oral and/or visual communication is organized and effective.
1	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are minimally present or correct. 	<ul style="list-style-type: none"> • Applications are minimally appropriate and accurate. 	<ul style="list-style-type: none"> • Little of the written, oral and/or visual communication is organized and effective.
0	<ul style="list-style-type: none"> • All descriptions of scientific terms, facts, concepts, principles, theories and methods are missing and/or incorrect. 	<ul style="list-style-type: none"> • All applications are missing and/or incorrect. 	<ul style="list-style-type: none"> • All of the written, oral or visual communication is missing and/or lacks organization.
Score			