

# Fertilizers & the Environment

**Media Type:** Video

**Duration:** 17 min.

**Goal:** To learn the basics of fertilizers and their relationship with the environment

**Description:** Fertilizers help replenish essential nutrients the soil loses. Students and beginning horticulturalists will replenish their knowledge of fertilizers with the advice provided in this presentation. The nutritional requirements of plants, the purpose of a fertilizer, fertilizer analysis, types, application, equipment, costs, records and schedules, handling and storage and effects on the environment are introduced.

**Objectives:**

1. The student will gain a basic knowledge of fertilizers.
2. The student will learn the proper application of plant and crop fertilizers.
3. The student will learn the importance of safety and environmental concerns related to fertilizers.



Agriculture, Food & Natural Resources Career Cluster (AG)

Cluster	Standard
	Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster™.
	Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Cluster™ and the role of agriculture, food and natural resources (AFNR) in society and the economy.
	Examine and summarize the importance of health, safety and environmental management systems in AFNR businesses.
	Analyze the interaction among AFNR systems in the production, processing and management of food, fiber and fuel and the sustainable use of natural resources.
Agribusiness Systems Career Pathway (AG-BIZ)	Apply management planning principles in AFNR businesses.
	Develop a business plan for an AFNR business.
	Use analytical procedures and instruments to manage environmental service systems.
Environmental Service Systems Career Pathway (AG-ENV)	Evaluate the impact of public policies and regulations on environmental service system operations.
	Develop proposed solutions to environmental issues, problems and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry and ecology.
	Demonstrate the operation of environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management and energy conservation).
Plant Systems Career Pathway (AG-PL)	Develop and implement a crop management plan for a given production goal that accounts for environmental factors.
	Apply the principles of classification, plant anatomy and plant physiology to plant production and management.

# Fertilizers & the Environment



College & Career Readiness Anchor Standards for Reading

## Reading Standards for Literacy in Science & Technical Subjects

Key Ideas & Details	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	
	9-10.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
Craft & Structure	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.	
	9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
	11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
Integration of Knowledge & Ideas	Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.	
	9-10.7	Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words.
	11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media in order to address a question or solve a problem.

College & Career Readiness Anchor Standards for Writing

## Writing Standards for Literacy in History/Social Studies & Technical Subjects

Text Types & Purposes	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.	
	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.	
	9-10.1	Write arguments focused on discipline-specific content.
Production & Distribution of Writing	9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
	9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

# Fertilizers & the Environment



College & Career Readiness Anchor Standards for Writing

## Writing Standards for Literacy in History/Social Studies & Technical Subjects

Research to Build & Present Knowledge	Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.	
	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.	
	Draw evidence from literary or informational texts to support analysis, reflection, and research.	
	9-10.7	Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
	9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
9-10.9	Draw evidence from informational texts to support analysis, reflection, and research.	
11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	

College & Career Readiness Anchor Standards for Writing

## Writing Standards for Literacy in History/Social Studies & Technical Subjects

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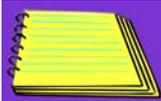


College & Career Readiness Anchor Standards for Speaking and Listening

## Speaking & Listening Standards

Comprehension & Collaboration	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.	
	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.	
	<i>9-10.1</i>	Initiate and participate effectively in a range of collaborative discussions with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
	<i>9-10.2</i>	Integrate multiple sources of information presented in diverse media or formats evaluating the credibility and accuracy of each source.
Presentation of Knowledge & Ideas	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.	
	Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.	
	Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.	
	<i>9-10.4</i>	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
	<i>9-10.5</i>	Make strategic use of digital media in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
	<i>9-10.6</i>	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

# Fertilizers & the Environment



## Lesson Plan

**Class 1:** Distribute the *Fertilizers & the Environment Worksheet* and *Vocabulary Handout* for students to use as review materials. Show the *Introduction, Nutritional Requirements of Plants, Fertilizer* and *Fertilizer Analysis* segments. Students should complete *Assessment I*. Show *Types and Kinds of Fertilizers* and *Application of Fertilizers* segment. Students should complete *Assessment II*. Distribute the *Types of Fertilizer Activity* and allow the remainder of the class for students to work. If student licenses have been purchased, an interactive version of this Activity is available in the “Interactive Activities” section.



Video  
11 min.

**Class 2:** Show *Application Methods, Equipment, Fertilization Records and Schedules* and *Proper Handling and Storage of Fertilizers* segments. Have students complete the *Fertilizer Equipment Activity*. Have students complete *Assessment III*. Show *Fertilizer Effects on the Environment, Environmental Regulations* and *Conclusion*. Students should complete *Assessment IV*. Distribute the *Record Keeping Regulations Activity* as well as the *Crossword* for students to complete. With remaining class time, allow students to begin working on *Environmental Concerns Project* and the *Determining the Correct Fertilizer Project*.



Video  
7 min.

**Class 3:** Hand out the *Fertilizers & the Environment Final Assessment* and allow time for students to complete. Introduce the *Fertilizer Labels Activity* and allow students to work. If student licenses have been purchased, an interactive version of this Activity is available in the “Interactive Activities” section. Introduce the *Environmental Concerns Project*.

**Class 4:** Have students turn in their *Environmental Concerns Project*. Select a few students to present their memo to

the class. Allow students to divide into groups and work on their *Determining the Correct Fertilizer Project*.

**Class 5:** Have students present the *Determining the Correct Fertilizer Project*.



## Lesson Links

### Association of American Plant Food Control Officials

- [www.aapfco.org](http://www.aapfco.org)

### The Fertilizer Institute

- [www.tfi.org](http://www.tfi.org)

### USDA

- [www.ers.usda.gov](http://www.ers.usda.gov)



## Career & Technical Student Organizations

### FFA

- Agronomy
- Food Science and Technology
- Nursery/Landscape



## Career Connections

Using the *Career Connections Activity*, allow students to explore the various careers associated with this lesson. See the *Activity* for more details. *If student licenses have been purchased:* Students will select the interviews to watch based on your directions. *If only a teacher license is purchased:* Show students all the career interviews and instruct them to only complete the interview form for the required number of interviews.

- iCEV51014, Kyle Letbetter, Nursery Manager, Landmark Nurseries
- iCEV50692, Keith Backman, Certified Professional Horticulturist & Crop Advisor, Dellavalle Laboratory, Inc.
- iCEV50022, Bill Deavours, Pesticide Deputy, Tulare County, CA
- iCEV50030, Jonathan Gilligan, Ph.D., Environmental Scientist, Vanderbilt University
- iCEV50062, Paul McDaniel, Ph.D., Professor of Soil Science, University of Idaho
- iCEV50065, Jena Moon, Land Management Biologist, U.S. Fish & Wildlife Service. Courtesy of Texas Tech University Department of Natural Resources Management.

# Fertilizers & the Environment



## Lab Activities

### Types of Fertilizer

#### Directions:

Pass out the *Types of Fertilizer Activity*. Students will read a description of a fertilizer and from this description students will be able to determine whether the fertilizer is a complete or incomplete fertilizer, if it is a blended, special purpose, slow release or organic fertilizer. If student licenses have been purchased, an interactive version of this Activity is available in the “Interactive Activities” section.

### Record Keeping Regulations

#### Directions:

Divide students into groups of three or four. Each group will select a state other than their home state. Make sure each group selects a different state. Groups should research their selected state’s record keeping regulations for fertilizer application and do the same for their home state. From information found they will present to the class a two minute presentation comparing and contrasting the group’s selected state’s regulations and their home state’s regulations.

### Fertilizer Labels

#### Directions:

Pass out the *Fertilizer Labels Activity*. Students will research how to read and analyze information from a fertilizer label and complete the worksheet. Allow students to take the activity home in order to complete their research, and have them turn in the activity the following class day. If student licenses have been purchased, an interactive version of this Activity is available in the “Interactive Activities” section.

### Fertilizer Equipment

#### Directions:

Students must determine which fertilizer equipment fits with each description and fill in the blanks. Next, students must list personal protective equipment which should be worn during fertilizer applications. Lead a short class discussion to ensure student understanding. An *Answer Key* has been provided.



## Projects

### Environmental Concerns

#### Directions:

Students will assume the role of a landscape management/crop production supervisor. As a manager students must research environmental concerns regarding fertilizer application. Students must also locate the regulations involved with fertilizer application along with consequences of not following the regulations from both an environmental and shop fine perspective. Using the Internet, library or any other available resources, students will research and locate the local environmental concerns regarding fertilizer application along with local regulations the consequences of not following those regulations. Using their research, students will draft a memo to their employees emphasizing the importance of proper fertilizer application. The memo should state the correct way to apply fertilizer, as well as the consequences to the environment if not applied correctly. Memos should be clear, easy to understand, grammatically correct and at least three paragraphs in length. Remind students to attach a citation sheet listing all sources used to their memo. Lead a class discussion so students can share their findings with the class.

### Determining the Correct Fertilizer

#### Directions:

Divide students into groups of four. Each group should select an area in their home state or a surrounding state. They will research the types of crops grown in that area and choose one crop to focus on. They will also research the soil type in their selected area. From their research they will determine the best fertilizer to use. Information provided on the fertilizer should include NPK, whether it is complete or incomplete, whether it is blended, special purpose, slow release or organic and application method. Students will present a five to ten minute slide show on their findings.