

<b>Course</b>	Agricultural Science II
<b>Unit</b>	Crop Science
<b>Lesson</b>	Harvesting and Storing Grains
<b>Estimated Time</b>	50 minutes
<b>Student Outcome</b>	

The student will be able to explain factors related to harvesting and storing quality grain.

### Learning Objectives

1. Identify the factors that determine the proper time to harvest grain crops.
2. Describe the factors that are used in federal grain grading.
3. Describe the factors that affect grain quality.
4. Describe the methods that are used to harvest grain crops.
5. Explain the factors that affect the quality of stored grains.
6. Describe how crop quality can be maintained during harvest and storage.
7. Identify the methods of drying grain.

### Grade Level Expectations

SC/ME/1/G/09-11/a      SC/ST/1/C/09-11/a

### Resources, Supplies & Equipment, and Supplemental Information

#### Resources

1. *Crop Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1992.
2. *Crop Science Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

#### Supplies & Equipment

- ☐ Glass jars
- ☐ Samples of commonly stored grain (e.g., corn, wheat, soybeans)

#### Supplemental Information

1. Internet Sites
  - ☐ Crops Publications. University of Missouri Extension. Accessed January 16, 2008, from <http://extension.missouri.edu/explore/agguides/crops/>.
  - ☐ Extension Publications from Purdue University Cooperative Extension Service and from other institutions. Accessed January 16, 2008, from <http://cobweb.ecn.purdue.edu/~grainlab/exten-pubs.htm>.
  - ☐ General Information on Grain Drying, Storage and Management. Agricultural Electronic Bulletin board, University of Missouri. Accessed January 16, 2008, from <http://agebb.missouri.edu/storage/economic/crmanual.htm>.
  - ☐ Grain Storage Tips: Factors and Formulas for Crop Drying, Storage and Handling. University of Minnesota Extension. Accessed January 16, 2008, from <http://www.extension.umn.edu/distribution/cropsystems/M1080-FS.pdf>.

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- ❑ Planning Grain Drying, Handling, and Storage Facilities. University of Minnesota Extension Service. Accessed January 16, 2008, from <http://www.bbe.umn.edu/extens/postharvest/planningfacilities.html>.
  - ❑ USDA Grading Standards and Moisture Conversion Table for Corn. Agronomy Guide, Purdue University Cooperative Extension Service. Accessed January 16, 2008, from <http://www.ces.purdue.edu/extmedia/AY/AY-225.pdf>.
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### Interest Approach

Collect several samples of commonly stored grain (e.g., corn, wheat, and soybeans). Divide each sample of grain into two small glass jars. Take one of the samples of each grain and add additional moisture to the jar to stimulate heat and mold damage. (This should be done in advance of the lesson to produce mold.) Use this for discussion.

### Communicate the Learning Objectives

1. Identify the factors that determine the proper time to harvest grain crops.
2. Describe the factors that are used in federal grain grading.
3. Describe the factors that affect grain quality.
4. Describe the methods that are used to harvest grain crops.
5. Explain the factors that affect the quality of stored grains.
6. Describe how crop quality can be maintained during harvest and storage.
7. Identify the methods of drying grain.

Instructor Directions	Content Outline
<b>Objective 1</b>  <i>It is important to harvest a crop at the optimum time in order to ensure the greatest yield and highest quality.</i>	<b>Identify the factors that determine the proper time to harvest grain crops.</b>  <ol style="list-style-type: none"><li>1. Plant characteristics<ol style="list-style-type: none"><li>a. Stage of maturity</li><li>b. Tendency to lodge</li><li>c. Tendency to shatter</li></ol></li><li>2. Climatic factors<ol style="list-style-type: none"><li>a. Rainfall</li><li>b. Humidity</li><li>c. Temperature</li></ol></li><li>3. Harvesting methods</li></ol>
<b>Objective 2</b>  <i>Grain quality is important to both the producer and the purchaser. To the producer, a better quality grade for the crop can mean a higher return for the investment. For the purchaser, grain quality is important to ensure that the grain can be processed into consumer products.</i>	<b>Describe the factors that are used in federal grain grading.</b>  <ol style="list-style-type: none"><li>1. Class</li><li>2. Test weight per bushel</li><li>3. Percentage of damaged kernels</li><li>4. Percentage of foreign material</li><li>5. Percentage of other classes</li></ol>

Instructor Directions	Content Outline
<p><b>Objective 3</b></p> <p><i>Grading agricultural products requires special skills. Grain quality is influenced by several factors.</i></p>	<p><b>Describe the factors that affect grain quality.</b></p> <ol style="list-style-type: none"> <li>1. Purity of crop and variety</li> <li>2. Percentage of weeds and other mixtures</li> <li>3. Percentage of diseased and damaged kernels</li> </ol>
<p><b>Objective 4</b></p> <p><i>Harvesting the grain crop is an important step in the process of grain production. The decision of which harvesting method to use is important.</i></p>	<p><b>Describe the methods that are used to harvest grain crops.</b></p> <ol style="list-style-type: none"> <li>1. Direct combine method</li> <li>2. Windrow-pickup combine method</li> </ol>
<p><b>Objective 5</b></p> <p><i>The potential for profit from high yielding crops can be decreased if the grain is improperly stored. When storing grain, consideration should be given to those factors that affect grain spoilage and deterioration.</i></p>	<p><b>Explain the factors that affect the quality of stored grains.</b></p> <ol style="list-style-type: none"> <li>1. High moisture content</li> <li>2. Heat damage</li> <li>3. Rotting</li> <li>4. Improper drying (too dry, too wet)</li> <li>5. Foreign material present</li> <li>6. Insect and rodent infestation</li> </ol>
<p><b>Objective 6</b></p> <p><i>Steps to prevent stored grain deterioration should be taken in advance in order to prevent problems.</i></p>	<p><b>Describe how crop quality can be maintained during harvest and storage.</b></p> <ol style="list-style-type: none"> <li>1. Harvest grain at proper moisture content</li> <li>2. Properly construct and maintain storage bins</li> <li>3. Protect against pests (insects, rodents, birds)</li> <li>4. Provide proper ventilation</li> <li>5. Secure from fire and wind damage</li> <li>6. Inspect grain frequently</li> </ol>
<p><b>Objective 7</b></p> <p><i>Ask students to give reasons for drying grain on the farm (reduce machine and field losses through early harvest, improved market price by more timely marketing, better market grade, reduced storage losses, etc.). Then, discuss the methods of drying stored grain.</i></p>	<p><b>Identify the methods of drying grain.</b></p> <ol style="list-style-type: none"> <li>1. Drying with forced, unheated air</li> <li>2. Drying with forced, heated air</li> <li>3. Field drying</li> </ol>

Instructor Directions	Content Outline
<b>Application</b>	<p>Other activities</p> <ol style="list-style-type: none"> <li>1. Take a field trip to a farm or local grain elevator and have students observe facilities used to dry and store grain crops.</li> <li>2. Visit a grain harvesting operation and allow students to observe the process.</li> </ol>
<b>Closure/Summary</b>	<p>Harvesting and storing quality grain involves harvesting in a timely manner, using appropriate methods for harvesting and storage, and maintaining stored grain to prevent losses due to spoilage.</p>
<b>Evaluation: Quiz</b>	<p>Answers:</p> <ol style="list-style-type: none"> <li>1. True</li> <li>2. True</li> <li>3. False</li> <li>4. False</li> <li>5. True</li> <li>6. a</li> <li>7. c</li> <li>8. b</li> <li>9. c</li> </ol>