

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: III. Soil Fertility and Management

Unit Objective:

Students will apply principles of soil fertility and management by conducting and analyzing soil tests and presenting, in an oral report, their crop recommendation and management strategy for the soil they sampled.

Show-Me Standards: 1.3, SC7

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Back-to-Basics Soil Fertility Information. Accessed November 11, 2003, from <http://www.back-to-basics.net/>.

Grassland Evaluation Contest Study Guide. University of Missouri-Columbia, Instructional Materials Laboratory, 1997.

"How to Take a Soil Sample." Missouri Department of Conservation. Accessed October 9, 2003, from <http://www.conserva.state.mo.us/landown/wild/landmgmt/practices.htm#how>.

International Potash Institute. Accessed October 9, 2003, from <http://www.ipipotash.org/>.

Missouri Cooperative Soil Survey. Accessed March 12, 2004, from <http://soils.missouri.edu/>.

Soil and Water Publications. MU Extension. University of Missouri-Columbia. Accessed October 9, 2003, from <http://muextension.missouri.edu/explore/agguides/soils/index.htm>.

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Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 6.
- Students will complete AS 1.1, Estimating Soil Texture by Feel; AS 2.1, Interpreting Soil Survey Books; AS 3.1, Interpreting Soil Test Results; AS 3.2, Collecting a Soil Sample; AS 4.1, Calculating Fertilizer Needs and Cost; AS 5.1, Determining Tillage Costs; AS 5.2, Soil Compaction and How It Develops; AS 5.3, Estimating the Percent of Residue Cover; AS 6.1, Measuring Slope; and AS 6.2 and AS 6.2A, Contour Farming and Soil Erosion.
- Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following locations: p. III-23, p. III-35, p. III-59, and p. III-70.

Performance-Based Assessment:

Students will work in groups to collect soil samples from an assigned area. Students will categorize the samples based on texture as well as have the soil chemically tested. Based on the results of the physical and chemical tests, they will recommend an appropriate crop and management strategy for the soil. Students will present their findings to the class in an oral report.

Assessment will be based on the accuracy of the interpretation of the soil analysis, crop and management recommendations, and the overall content and presentation of the oral report.

**Unit III—Soil Fertility and Management
Instructor Guide**

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into groups and assign each group a different area from which to collect soil samples, such as a yard, conservation area, football or softball field, or farm.
 - a. If it is more practical, because of time or cost constraints, to only collect and test one composite sample, have students collect samples within one designated site and conduct this activity as a class project.
 - b. If the activity is conducted as a class project, have students present their findings in a short written report, rather than an oral report, so that the groups will not be presenting the same information to the class.
2. Have each group collect soil samples to create a composite sample.
 - a. Use AS 3.2, Collecting a Soil Sample, p. III-51. See also AS 3.1, Interpreting Soil Test Results, p. III-49, which can be used to identify components of a soil test and interpret the results.
 - b. Be sure to collect samples early and allow enough time to receive a response if samples are submitted to an outside agency for testing.
3. Have students determine the soil texture based on feel. Use AS 1.1, Estimating Soil Texture by Feel, p. III-17.
4. Test the soil samples by having students submit their composite samples to a University of Missouri Outreach & Extension office or by testing the samples in class.
 - a. Extension offices can be located by searching the University of Missouri Outreach & Extension web site at <http://outreach.missouri.edu/regions/>.
 - b. If samples are tested in class, provide testing equipment and explain how to use it properly.
 - c. If students test the samples, verify the accuracy of their results by retesting the samples.
5. Based on the results of the physical and chemical tests, have the students recommend an appropriate crop and management plan for the soil they sampled. Have students present their findings to the class as an oral report.

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6. Indicate what information students must provide for their samples in their report. Topics could include the following:
 - Description of topography
 - Physical properties of the sample
 - Interpretation of physical properties
 - Soil analysis results
 - Interpretation of soil analysis
 - Crop recommendation
 - Management plan
7. Students should be prepared to answer questions about their interpretations and recommendations.
8. Students should also incorporate other elements, such as charts or illustrations, and make use of presentation software or other equipment or material as needed to make the report interesting and informative.
9. The final assessment score will be based on the accuracy of the interpretations of the physical and chemical soil test results, crop and management recommendations, and the overall content and presentation of the report.

**Unit III—Soil Fertility and Management
Student Handout**

1. The instructor will divide the class into groups and assign each group an area from which to collect soil samples.
2. Use the procedures in AS 1.1, Estimating Soil Texture by Feel, to estimate the soil's sand, silt, and clay content and determine its texture.
3. Submit your composite sample for testing.
4. Compile your observations and test results and present your findings to the class as an oral report. Keep in mind questions such as the following:
 - What is the topography of the sample area like?
 - What are the physical characteristics of the soil?
 - What do the physical characteristics indicate about the sample?
 - What does the soil analysis indicate about the sample?
 - Based on the physical characteristics and the soil analysis results, what crop would I plant in this type of soil?
 - What management plan would I recommend?
5. Be prepared to answer questions about your interpretations and recommendations.
6. Incorporate other elements, such as charts or illustrations, and make use of presentation software or other equipment or material as needed to make your report interesting and informative.
7. Your final assessment score will be based on the accuracy of your interpretations of the physical and chemical soil test results, crop and management recommendations, and the overall content and presentation of your report.

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Unit III—Soil Fertility and Management Scoring Guide

Name _____

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Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content of Oral Report	<ul style="list-style-type: none"> <input type="checkbox"/> Information is complete <input type="checkbox"/> Crop and management recommendations are valid <input type="checkbox"/> Interpretation of physical and chemical soil tests are accurate <input type="checkbox"/> Report is well organized <input type="checkbox"/> Good use of supporting materials 	0 criteria met	1-2 criteria met	3 criteria met	4 criteria met	All 5 criteria met	X 20	
Presentation of Oral Report	<ul style="list-style-type: none"> <input type="checkbox"/> Holds audience interest <input type="checkbox"/> Speaks clearly and uses correct grammar <input type="checkbox"/> Maintains good posture <input type="checkbox"/> Needs little or no prompting from the instructor 	0 criteria met	1 criterion met	2 criteria met	3 criteria met	4 criteria met	X 5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

