



Western Technical College

10006169 Soil Fertility & Nutrient Management

Course Outcome Summary

Course Information

Description	Course will cover the fundamental and applied principles and concepts of soil fertility and plant nutrition. Attention will be given to the nutrient requirements of the commonly produced agronomic crops of our area. Course will provide the student with the information necessary to plan and produce agronomic crops based on crop needs and available resources. Students will be able to interpret soil test reports and make recommendation based on given information for related crop plants. In-field activities will be used to effectively reinforce the material presented in class.
Career Cluster	Agriculture, Food and Natural Resources
Instructional Level	Associate Degree Courses
Total Credits	2
Total Hours	54

Textbooks

Soil Fertility Manual. Copyright 2019. International Plant Nutrition Institute. Publisher: The Fertilizer Institute. **ISBN-13:** 978-1-734-38600-4. Required.

Dirt to Soil: One Family's Journey into Regenerative Agriculture. Copyright 2018. Brown, Gabe. Publisher: Chelsea Green Publishing. **ISBN-13:** 978-1-60358-763-1. Required.

Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Live Responsibly: Embrace Sustainability
3. Refine Professionalism: Act Ethically

4. Refine Professionalism: Improve Critical Thinking
5. Refine Professionalism: Participate Collaboratively

High Impact Practices

1. Community Engagement - in this course, you will explore and reflect on opportunities presented by the college and the program to become more involved in the community (ex: Employer Spotlights, Volunteerism, Professional Associations, and Community Action Boards)
2. Work-Based Learning: this course applies your learning to your desired profession by working in industry placements such as internships, practicums, clinicals, or co-ops.

Program Outcomes

1. Interact as a professional in Agribusiness
2. Apply relevant technologies
3. Apply economic and marketing strategies to Agribusiness Industry
4. Create a Crop Management Plan

Course Competencies

1. Relate soil fertility to productivity.

Assessment Strategies

- 1.1. Oral Presentation
- 1.2. Written Product

Criteria

You will know you are successful when

- 1.1. you describe differences and similarities of fertile soil and a productive soil.
- 1.2. you explain elements affecting soil productivity.
- 1.3. you describe the importance of CEC to soil productivity and plant growth.
- 1.4. you determine what factors influence fertilizer use and needs.

Learning Objectives

- 1.a. Define what makes up a productive soil.
- 1.b. Classify primary nutrients
- 1.c. Classify secondary nutrients
- 1.d. Classify micro/trace elements
- 1.e. Describe recognized levels of soil fertility
- 1.f. Relate soil texture and structure to fertility
- 1.g. Summarize Cation Exchange Capacity (CEC).
- 1.h. Compare how CEC factors affect a soils productivity and plant growth.
- 1.i. Summarize soil colloids and ions
- 1.j. Describe anion activity in the soil
- 1.k. Correlate organic matter to soil fertility
- 1.l. Describe various fertilizer terms.

2. Analyze management of soil pH.

Assessment Strategies

- 2.1. Oral Presentation
- 2.2. Written Product

Criteria

You will know you are successful when

- 2.1. you describe how lime reduces soil acidity.

- 2.2. you compare factors affecting soil pH.
- 2.3. you justify liming needs for a particular soil.
- 2.4. you recommend appropriate level and frequency of lime applications.
- 2.5. you compare sources of liming materials for quality and practical application.
- 2.6. you relate the impact of high pH soils: Calcareous, Saline, and alkali (sodic), on crop growth and soil condition.

Learning Objectives

- 2.a. Explain soil pH
- 2.b. Identify factors affecting soil pH
- 2.c. Determine ag lime requirements to correct soil pH levels
- 2.d. Outline benefits of correcting soil pH levels
- 2.e. Determine desirable pH levels for various agronomic crops
- 2.f. Explain how ag lime reduces soil acidity
- 2.g. Recommend a liming program for given production scenarios
- 2.h. Summarize materials used for pH modification
- 2.i. Predict crop responses to liming
- 2.j. Calculate cost of liming programs

3. Analyze roles of major and micro nutrients on plant growth and development.

Assessment Strategies

- 3.1. Oral Presentation
- 3.2. Written Product

Criteria

You will know you are successful when

- 3.1. you explain the role of nutrients in the plant and the soil.
- 3.2. you recognize typical nutrient deficiency symptoms and their general location on the plant.
- 3.3. you explain how nutrients affects soil acidity.
- 3.4. you identify nutrient sources and their significance to plant growth.
- 3.5. you assess potential ground water problems from excess nutrients.
- 3.6. you summarize how nutrients can be lost from the soil system.
- 3.7. you compare and contrast the differences between mineralization and immobilization of nutrients.

Learning Objectives

- 3.a. Diagram the nitrogen cycle.
- 3.b. Assess the role of nutrients in plants.
- 3.c. Recognize typical plant deficiency symptoms.
- 3.d. Determine how nutrients affects soils acidity.
- 3.e. Contrast the various nitrogen sources and their significance to plant growth.
- 3.f. Assess potential groundwater problems from nitrates.
- 3.g. Explain the significance of a nitrogen stabilizer/ inhibitor.
- 3.h. Summarize how nutrients are lost from the soil system.
- 3.i. Compare the differences of mineralization and immobilization of nitrogen.
- 3.j. Compare the significance of nitrification and denitrification to N loss.
- 3.k. Classify symbiotic and non-symbiotic nitrogen fixation processes.
- 3.l. Determine how to detect and reduce nitrate toxicity.
- 3.m. Compare how various forms of natural organic sources can impact the soil system.

4. Assess environmental impact of fertilizers.

Assessment Strategies

- 4.1. Oral Presentation
- 4.2. Written Product

Criteria

You will know you are successful when

- 4.1. you summarize concerns related to nutrient losses..
- 4.2. you describe the impact of various nutrients in surface waters.
- 4.3. you describe the impact of various nutrients in ground water.
- 4.4. you recommend practices to secure nutrients at point of application.

Learning Objectives

- 4.a. Investigate potential for nutrient losses
- 4.b. Examine impact of various nutrients in surface waters
- 4.c. Examine impact of various nutrients in ground water
- 4.d. Explore practices to secure nutrients at point of application
- 4.e. Determine best practice to secure nutrients based on various situations.

5. Evaluate proper soil sampling.

Assessment Strategies

- 5.1. Oral Presentation
- 5.2. Written Product

Criteria

You will know you are successful when

- 5.1. you demonstrate proper technique for collecting a soil sample.
- 5.2. you demonstrate proper technique for collecting a plant tissue sample.
- 5.3. you distinguish between appropriate and non-appropriate soil sampling areas.
- 5.4. you distinguish between appropriate and non-appropriate plant areas to be sampled.
- 5.5. you prepare collected soil sample for shipping to soil testing lab.

Learning Objectives

- 5.a. Demonstrate the proper technique for collecting a soil sample.
- 5.b. Simulate the proper technique for collecting a plant tissue sample.
- 5.c. Recognize the appropriate soil areas to be sampled.
- 5.d. Recognize the appropriate plant areas to be sampled.
- 5.e. Identify where and how to send samples.
- 5.f. Prepare collected samples for testing.
- 5.g. Prepare a soil sample test information sheet.

6. Interpret soil test results.

Assessment Strategies

- 6.1. Oral Presentation
- 6.2. Written Product

Criteria

You will know you are successful when

- 6.1. you summarize a soil and plant tissue report.
- 6.2. you identify deficiencies in soil or plant from test results.
- 6.3. you make recommendations to improve soil quality.
- 6.4. you develop a planned fertilizer application.
- 6.5. you develop a planned lime application.

Learning Objectives

- 6.a. Justify fertilizer selection and placement choice when banding or row applying fertilizers versus broadcast applications.
- 6.b. Develop a planned fertilizer application based on a given set of circumstances.
- 6.c. Correlate how soil and plant tissue tests relate to nutrient deficiencies.
- 6.d. Interpret a soil and plant tissue test report.
- 6.e. Analyze a soil test report.
- 6.f. Calculate appropriate fertilizer recommendations and application rates.
- 6.g. Determine lime requirements based on soil test results and crop needs.
- 6.h. Differentiate maintenance and corrective applications

7. Create an advanced nutrient management plan.

Assessment Strategies

- 7.1. Oral Presentation
- 7.2. Written Product

Criteria

You will know you are successful when

- 7.1. you perform a soil test.
- 7.2. you analyze the soil to determine nutrient needs.
- 7.3. you select the materials to provide nutrients needed based on soil analysis.
- 7.4. you calculate the amount of material to purchase.
- 7.5. you recommend application rates of various nutrient.
- 7.6. you calculate cost of fertility program for field on a per acre basis.

Learning Objectives

- 7.a. Determine nutrient needs from soil test.
- 7.b. Identify materials used to provide nutrients needed.
- 7.c. Convert actual pounds needed to material pounds for purchase.
- 7.d. Recommend application rates of various nutrient.
- 7.e. Determine cost of fertility program for field on a per acre basis.