Idaho CTE

Plant and Soil (2025)

PROFESSIONAL ORGANIZATIONS AND LEADERSHIP 1.0

1 Student Leadership in Career Technical Student Organizations (CTSO) and Professional Associations 1.1

1. Explore the role of professional organizations and/or associations in the Plant and Soil Science industry. 1.1.1
2. Define the value, role, and opportunities provided through career technical student organizations. 1.1.2
3. Engage in career exploration and leadership development. 1.1.3

2 Supervised Agricultural Experience 1.2

1. Maintain Supervised Agriculture Experience (SAE) record books. 1.2.1
2. Describe the proficiency award areas related to the SAE program area. 1.2.2
3. Describe necessary steps to receive higher degrees in FFA. 1.2.3

PLANT ANATOMY AND IDENTIFICATION 2.0

1 Plant Anatomy 2.1

1. Describe the primary parts of a plant and their functions. 2.1.1
2. Describe the parts of plant cells and their functions. 2.1.2
3. Identify the three basic types of tissues found in a plant (i.e., dermal, vascular, ground) and their functions. 2.1.3

2 Plant Identification 2.2

1. Describe the systems of plant classification. 2.2.1
2. Differentiate between plant parts and modifications (e.g., roots, stems, leaves, flowers, fruits, seeds). 2.2.2
3. Determine plant identification by using a dichotomous key. 2.2.3
4. Identify common Idaho crops. 2.2.4

PLANT PROCESSES AND GROWTH AND DEVELOPMENT 3.0

1 Plant Processes 3.1

1. Differentiate among photosynthesis, respiration, transpiration and water/nutrient uptake. 3.1.1
2. Describe the process and purpose of photosynthesis, respiration, transpiration and water/nutrient uptake. 3.1.2
3. List factors that affect the rate of photosynthesis, respiration, transpiration, and water/nutrient uptake. 3.1.3

2 Plant Growth and Development 3.2

1. List the stages of plant growth and development (e.g., germination, vegetative growth, reproductive growth). 3.2.1
2. Describe environmental conditions affecting the vegetative growth of plants. 3.2.2
3. Describe asexual and sexual reproduction in plants. 3.2.3
4. Cultivate asexual and sexual reproduction in plants (e.g., grafting, tubers, cuttings, divisions, seeding, hand pollination). 3.2.4

3 Classical Plant Breeding 3.3

1. Describe methods and strategies of pollination. 3.3.1
2. Describe the selective plant breeding process. 3.3.2
3. Calculate heritability. 3.3.3
4. Interpret plant breeding data. 3.3.4

SOIL AND WATER 4.0

1 Introduction to Soils 4.1

1. Describe the function of soil as it relates to plant growth, development, and maintenance. 4.1.1
2. Describe the factors that affect soil formation (e.g., climate, parent material, organisms, topography, time). 4.1.2
3. Classify physical properties of soil (e.g., texture, structure, color, profile). 4.1.3
4. Describe characteristics of the six types of soil structure (i.e., granular, blocky, platy, prismatic, columnar, massive). 4.1.4
5. Determine soil texture from a sample. 4.1.5
6. Determine how pH affects the soil. 4.1.6
7. Identify methods of amending soil pH. 4.1.7
8. Compare biotic and abiotic components of soil (e.g., organic matter, mineral matter, air space, water space). 4.1.8

2 Soil Moisture Management 4.2

1. Describe water movement through different soil textures. 4.2.1
2. Define key soil moisture terms (e.g., volumetric water content, water potential, water holding capacity, field capacity). 4.2.2
3. Identify methods of measuring soil moisture. 4.2.3

3 Irrigation Management 4.3

1. Identify the need for irrigation, including water holding capacity and soil moisture. 4.3.1
2. Describe methods of irrigation (e.g., sources, delivery, equipment). 4.3.2
3. Select irrigation methods for optimum production goals (e.g., equipment, crops, resource availability, economics). 4.3.3
4. Describe Idaho's water law based on the appropriation doctrine and its significance in current state agriculture. 4.3.4

4 Soil Health 4.4

1. Identify characteristics of soil health (e.g., high organic matter, good soil structure, balanced pH, high biological activity, adequate nutrition). 4.4.1
2. Describe methods for improving soil health (e.g., cover crops, reduced tillage, multiple species, strip till, compost). 4.4.2
3. Describe the limitations associated with soil health practices (e.g., economics, manpower, sustainability, time, environment). 4.4.3

PLANT NUTRITION 5.0

1 Sources and Roles of Plant Nutrients 5.1

1. Identify primary nutrients, secondary nutrients, and micronutrients. 5.1.1
2. Differentiate the roles and functions of primary nutrients, secondary nutrients, and micronutrients in the plant. 5.1.2
3. Identify the primary sources (i.e., plant available, nutrient form) of N-P-K-S. 5.1.3
4. Describe nutrient uptake patterns (e.g. diffusion, interception, mass flow). 5.1.4
5. Identify movement and losses of nutrients from agroecosystems. 5.1.5

2 Plant Nutrient Deficiencies 5.2

1. Identify common nutrient deficiencies in crops. 5.2.1
2. Describe the common causes of nutrient deficiencies in crops. 5.2.2
3. Diagnose nutrient deficiencies and common problems caused by biological pests. 5.2.3

3 Soil and Plant Nutrients 5.3

1. Demonstrate soil sampling techniques. 5.3.1
2. Interpret Soil Analysis. 5.3.2
3. Calculate nutrient removal rate by crop. 5.3.3
4. Calculate fertilizer application and cost, based on soil analysis. 5.3.4

INTEGRATED PEST MANAGEMENT 6.0

1 Concepts and Principles of Integrated Pest Management 6.1

1. Describe methods of integrated pest management (e.g., cultural, biological, mechanical, chemical). 6.1.1
2. Identify elements of the disease triangle. 6.1.2
3. Analyze economic thresholds of crop damage caused by disease, insects, and weeds. 6.1.3
4. Describe the limitations associated with integrated pest management methods (e.g. resistance management, beneficial insects, eradication vs. control). 6.1.4

2 Pest Identification 6.2

1. Identify common Idaho weeds, insects, and diseases. 6.2.1
2. Describe competition and economic losses caused by pests. 6.2.2

EMERGING TECHNOLOGIES 7.0

1 Advancements in Plant and Soil Technology 7.1

1. Describe the improvements and limitations of genetic engineering. 7.1.1
2. Describe the tools and techniques used for genetic modification (e.g., CRISPR, GMO, Roundup Ready, Liberty Link, Dicamba). 7.1.2
3. Describe current industry automation and precision agriculture technologies. 7.1.3
4. Describe advancements in fertilizers, chemical, and biologicals and their impacts on Good Agricultural Practices (GAP) and sustainability. 7.1.4

CROP PRODUCTION OPERATIONS 8.0

1 Crop Production 8.1

1. Describe procedures in the production, harvesting, handling, processing, and storing of Idaho crops and crop products. 8.1.1
2. Interpret general maturity and harvest-time guidelines for specific local plant products. 8.1.2
3. Describe common marketing methods and shipping characteristics for Idaho crops. 8.1.3

2 Operational Safety 8.2

1. Describe personal protection equipment requirements. 8.2.1
2. Differentiate between safe and unsafe work practices. 8.2.2
3. Interpret chemical label directions and information on Safety Data Sheets (SDS). 8.2.3
4. Describe safety hazards associated with crop production equipment and related safety practices (e.g., lockout/tagout, emergency response, safety plan). 8.2.4