Arkansas CTE

Plant Systems: Plant Science (2020)

Evaluate and implement the steps and requirements to pursue a career opportunity in Plant Science. 1

1 **Evaluate and implement the steps and requirements to pursue a career opportunity in Plant Science.** 1.1

1. Examine the educational, training and experiential requirements to pursue a career in Plant Science (e.g., degrees, certifications, training, internships, etc.). 1.1.1
2. Analyze personal skillset and create a plan for obtaining the required education, training and experiences to obtain a career in Plant Science. 1.1.2

2 **Assess the opportunities in Plant Science available through Career Development Events, Supervised Agricultural Experiences and other FFA activities.** 1.2

1. Examine the Nursery and Landscape, Floriculture or Agronomy Career Development Events for opportunities to exhibit skills needed in Plant Science. 1.2.1
2. Research ways that Plant Science or the skills needed may be implemented as a Supervised Agricultural Experience, and other FFA activities that might involve Plant Science. 1.2.2

Develop and implement a crop management plan for a given production goal that accounts for environmental factors. 2

1 **Determine the influence of environmental factors on plant growth.** 2.1

1. Identify and summarize the three measurements of light – color, intensity and duration – that affect plant growth. 2.1.1
2. Analyze and describe plant responses to light color, intensity and duration. 2.1.2
3. Identify and summarize the effects of air and temperature on plant metabolism and growth. 2.1.3
4. Identify and summarize the effects of water quality on plant growth (e.g., pH, dissolved solids, etc.) 2.1.4

2 **Prepare and manage growing media for use in plant systems.** 2.2

1. Identify the major components of growing media and describe how growing media support plant growth. 2.2.1
2. Describe the physical and chemical characteristics of growing media and explain the influence they have on plant growth. 2.2.2
3. Identify the categories of soil water. 2.2.3
4. Discuss how soil drainage and water-holding capacity can be improved. 2.2.4

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3 **Develop and implement a fertilization plan for specific plants or crops.** 2.3

1 Identify the essential nutrients for plant growth and development and their major functions (e.g., nitrogen, phosphorous, potassium, etc.). 2.3.1

2 Analyze the effects of nutrient deficiencies and symptoms and recognize environmental causes of nutrient deficiencies. 2.3.2

3 Discuss the influence of pH and cation exchange capacity on the availability of nutrients. 2.3.3

4 Contrast pH and cation exchange capacity between mineral soil and soilless growing media. 2.3.4

5 Collect soil and plant tissue samples using generally accepted procedures and explain how incorrect sample collection will affect the results of a laboratory analysis. 2.3.5

6 Interpret laboratory analyses of soil and tissue samples. 2.3.6

7 Identify fertilizer sources of essential plant nutrients: explain fertilizer formulations, including organic and inorganic; and describe different methods of fertilizer application. 2.3.7

8 Research and summarize production methods focused on soil management (e.g., crop rotation, companion planting, cover crops, etc.). 2.3.8

9 Summarize the impact of environmental factors on nutrient availability (e.g., moisture, temperature, pH, etc.). 2.3.9

Apply principles of classification, plant anatomy, and plant physiology to plant production and management. 3

1 **Classify plants according to taxonomic systems.** 3.1

1 Identify and summarize systems used to classify plants based on specific characteristics. 3.1.1

2 Describe the morphological characteristics used to identify agricultural and herbaceous plants (e.g., life cycles, growth habit, plant use and as monocotyledons or dicotyledons, woody, herbaceous, etc.). 3.1.2

2 **Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.** 3.2

1 Identify structures in a typical plant cell and summarize the function of plant cell organelles. 3.2.1

2 Identify and summarize the components, the types and the functions of plant roots. 3.2.2

3 Identify and summarize the components and the functions of plant stems. 3.2.3

4 Research and summarize leaf morphology and the functions of leaves. 3.2.4

5 Identify and summarize the components of a flower, the functions of a flower and the functions of flower components. 3.2.5

6 Apply knowledge of flower structure to differentiate between the types of flowers (e.g., complete, incomplete, perfect, imperfect). 3.2.6

7 Identify and summarize the functions of components of seeds and fruit. 3.2.7

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8 Analyze and categorize the major types of seeds and fruits. 3.2.8

3 Apply knowledge of plant physiology and energy conversion to plant systems. 3.3

1 Summarize the importance of photosynthesis to plant life on earth and the process of photosynthesis, including the types (c3, c4, Cam), its stages (e.g., light-dependent and light independent reactions), and its products and byproducts. 3.3.1

2 Summarize the stages of cellular respiration including their products and byproducts. 3.3.2

3 Summarize primary growth and the role of the apical meristem. 3.3.3

4 Identify and categorize the five groups of naturally occurring plant hormones and synthetic plant growth regulators. 3.3.4

5 Analyze and identify the plant responses to plant growth regulators and different forms of tropism. 3.3.5

6 Compare and contrast the effects of transpiration, translocation and assimilation on plants. 3.3.6

Propagate, culture and harvest plants and plant products based on current industry standards. 4

1 Demonstrate plant propagation techniques in plant system activities. 4.1

1 Identify examples of and summarize pollination, cross-pollination and self-pollination of flowering plants. 4.1.1

2 Demonstrate sowing techniques for providing favorable conditions to meet the factors of seed germination. 4.1.2

3 Summarize optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation, layering, budding and grafting. 4.1.3

2 Develop and implement a management plan for plant production. 4.2

1 Research and summarize the importance of starting with pest and disease free propagation material. 4.2.1

2 List and summarize the reasons for preparing growing media before planting. 4.2.2

3 Determine seeding rate need for specified plant population or desired quantity of finished plants. 4.2.3

4 Observe and record environmental conditions during the germination, growth and development of a crop. 4.2.4

5 Summarize the stages of plant growth and the reasons for controlling plant growth. 4.2.5

6 Identify and categorize structures and technologies used for controlled atmosphere production of plants. 4.2.6

7 Summarize the use of hydroponic and aquaponic systems for plant production. 4.2.7

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3 **Develop and implement a plan for integrated pest management for plant production.** 4.3

1 Identify and categorize plant pests, diseases and disorders. 4.3.1

2 Identify and analyze major local weeds, insect pests and infectious and noninfectious plant diseases. 4.3.2

3 Diagram the life cycle of major plant pests and diseases. 4.3.3

4 Identify and summarize pest control strategies associated with integrated pest management and the importance of determining economic threshold. 4.3.

4 **Apply principles and practices of sustainable agriculture to plant production.** 4.4

1 Compare and contrast the alignment of different production systems (conventional and organic) with USDA sustainable practices criteria. 4.4.1

2 Summarize national/international and local/regional food production systems. 4.4.2

5 **Harvest, handle and store crops according to current industry standards.** 4.5

1 Identify and summarize harvesting methods and equipment. 4.5.1

Apply principles of design in plant systems to enhance an environment (e.g., floral, forest landscape, and farm). 5

1 **Evaluating, identifying and preparing plants to enhance an environment.** 5.1

1 Identify and categorize plants by their purpose (e.g., floral plants, landscape plants, house plants, etc.). 5.1.1

2 Summarize the applications of design in agriculture and ornamental plant systems. 5.1.2

2 **Assess and apply sales principles and skills to accomplish AFNR business objectives.** 5.2

1 Identify and categorize tools used for design (e.g., computer landscape software, drawing tools, florist tools, etc.) 5.2.1