

# 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

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**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

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**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

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**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

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### **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

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

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## **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

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## **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

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## **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

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## **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

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

- 1 Identify and summarize harvesting methods and equipment. 4.5.1

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**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

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**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