

# Plant Science

**Plant Nutrition: Select and apply macronutrients and micronutrients based on deficiencies identified from the use of industry-driven testing, application, methods, and optimum management strategies that account for environmental factors.** 8.1

- 1 Compare and contrast organic and inorganic sources of macronutrients and micronutrients.** 8.1.1
- 2 Describe the functions of macronutrients and micronutrients in plants and the role that microorganisms play in plant nutrition.** 8.1.2
- 3 Identify and describe the nutrient recommendations of a plant for a desired production setting.** 8.1.3
- 4 Identify symptoms and causes of plant nutrient deficiencies and toxicities.** 8.1.4
- 5 Collect soil and plant tissue for testing and analysis using standard industry practice.** 8.1.5
- 6 Analyze and draw conclusions from soil and plant tissue test data and determine management recommendations for increased production, increased profitability, enhanced environmental protection, and improved suitability.** 8.1.6
- 7 Distinguish between biotic and abiotic factors (e.g., soil type, minerals, pH, microorganisms) that influence and optimize the availability of nutrients for plants.** 8.1.7
- 8 Calculate nutrient requirements and select nutrient sources and additives for the highest potential yield.** 8.1.8
- 9 Calculate nutrient requirements and select nutrient sources and additives for the highest return on investment.** 8.1.9
- 10 Determine the nutrient content of organic and inorganic fertilizers.** 8.1.10
- 11 Select the methods and time of nutrient application and apply nutrients.** 8.1.11
- 12 Describe and apply the five 5 R's of nutrient management: (1) right source of fertilizer at the (2) right rate at the (3) right time in the (4) right place with the (5) right irrigation method.** 8.1.12

**Plant Reproduction: Propagate plants and cultivars for specific performance characteristics under a**

- 1 Identify the reproductive anatomy of plants and describe their physiological functions.** 8.2.1
- 2 Describe how biotic and abiotic factors (e.g., insects, light, temperature, microorganisms, moisture, location) influence plant reproduction.** 8.2.2

variety of production systems. 8.2

3 Compare and contrast variations of plant reproductive systems among plant species. 8.2.3

4 Describe how artificial selection methods are used in plant breeding to improve plant traits. 8.2.4

5 Select and apply methods of asexual plant propagation. 8.2.5

**Pest Management:**  
Develop and implement an integrated pest management (IPM) plan by scouting and identifying specific plant pests and the damage they cause and apply specialized control methods. 8.3

1 Identify and classify insects, weeds, pathogens, animal pests, and describe the damage they cause. 8.3.1

2 Examine the interrelationships of the disease triangle among host, pathogen, and environment. 8.3.2

3 Analyze and calculate the economic threshold of pest damage. 8.3.3

4 Determine the components of an integrated pest management plan and related safety practices. 8.3.4

5 Describe native and transgenic adaptations and modifications that have led to plant tolerance or resistance to fungal, bacteria, and insect pests. 8.3.5

6 Describe the types and functions of biological, mechanical, and chemical control methods. 8.3.6

7 Develop an IPM plan, based on pest life cycles, available treatments, application methods, and evaluate its impact on the environment (e.g. drift, application rate and long-term soil health). 8.3.7

**Growth and Management:** Explain, manage, and manipulate plants through all stages of growth and development. 8.4

1 Identify and classify plants using taxonomy. 8.4.1

2 Identify plant anatomical structures and their functions. 8.4.2

3 Identify and classify seeds. 8.4.3

4 Identify and classify plants and describe management decisions at all stages. 8.4.4

5 Explain the requirements of photosynthesis and identify the products and byproducts. 8.4.5

6 Explain the process and importance of transpiration in plant growth and development. 8.4.6

7 Understand aerobic respiration and its relationship to plant growth and management. 8.4.7

8 Explain primary and secondary plant growth. 8.4.8

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- 9 Identify plant responses to plant growth regulators and different forms of tropism.** 8.4.9

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  - 10 Understand the environmental and artificial factors that influence plant germination, growth, and development.** 8.4.10

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  - 11 Select, evaluate, and prepare soil or media for planting.** 8.4.11

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  - 12 Understand and evaluate the process by which plants are selected in relation to production use.** 8.4.12

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  - 13 Evaluate and implement planting practices.** 8.4.13

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  - 14 Describe factors related to seed quality, treatment, and density that affect emergence, stand uniformity, and seedling health.** 8.4.14

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  - 15 Evaluate and implement transplanting practices.** 8.4.15

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  - 16 Control plant growth through mechanical and chemical means.** 8.4.16

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  - 17 Analyze plant water requirements and describe methods of irrigation.** 8.4.17

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  - 18 Compare and contrast inorganic and organic production practices.** 8.4.18

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  - 19 Identify and describe production practices that lead to plant resistance and tolerance.** 8.4.19

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  - 20 Compare and contrast management practices in controlled and natural growing environments.** 8.4.20

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  - 21 Distinguish between biotic and abiotic factors that influence plant stress.** 8.4.21
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**Harvesting: Describe and implement harvesting methods.** 8.5

- 1 Determine crop readiness for salability and environmental conditions that can impact crop quality at harvest.** 8.5.1

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  - 2 Describe safety precautions to take when harvesting.** 8.5.2

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  - 3 Evaluate techniques to maximize yield through mechanical or hand harvesting methods.** 8.5.3

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  - 4 Calculate and evaluate potential yield and loss due to harvesting.** 8.5.4

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  - 5 Evaluate the impact of harvest techniques on the quality of plants and plant products.** 8.5.5

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  - 6 Identify and implement harvesting methods and equipment.** 8.5.6

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  - 7 Implement management practices to reduce loss.** 8.5.7
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**Handling Storage:  
Handle and store plants  
and plant products to  
maximize quality and  
longevity. 8.6**

- 1 Describe safety precautions in handling and storage practices. 8.6.1**

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- 2 Explain, monitor, and manipulate conditions for optimal handling and storage of plants and plant products. 8.6.2**

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- 3 Calculate potential yield and loss due to processing and storage. 8.6.3**

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- 4 Prepare products for sale, transportation, and storage. 8.6.4**

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- 5 Identify storage methods and storage capacity for plants and plant products. 8.6.5**

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- 6 Explain the reasons for preparing plants and plant products for distribution. 8.6.6**

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- 7 Implement and evaluate techniques for grading, handling, blending, segregating, packaging, and loading plants and plant products for distribution or transportation. 8.6.7**