# CONTENT STANDARD 1.0: SAFETY IN THE ORNAMENTAL HORTICULTURE INDUSTRY

Performance Standard 1.1: Safe Work Practices

<table>
<thead>
<tr>
<th>1.1.1</th>
<th>Identify and properly use personal protection equipment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.2</td>
<td>Read, understand and follow label directions and SDS (safety data sheet).</td>
</tr>
<tr>
<td>1.1.3</td>
<td>Properly identify common hand tools and power equipment.</td>
</tr>
<tr>
<td>1.1.4</td>
<td>Safely use common hand tools and power equipment.</td>
</tr>
<tr>
<td>1.1.5</td>
<td>Complete (EPA) worker protection handler verification card training.</td>
</tr>
</tbody>
</table>

# CONTENT STANDARD 2.0: PLANT ANATOMY

Performance Standard 2.1: Plant Cells

<table>
<thead>
<tr>
<th>2.1.1</th>
<th>Label the parts of a plant cell.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.2</td>
<td>Differentiate between a plant and animal cell.</td>
</tr>
<tr>
<td>2.1.3</td>
<td>Explain the function of plant cell organelles.</td>
</tr>
</tbody>
</table>

Performance Standard 2.2: Root Anatomy

<table>
<thead>
<tr>
<th>2.2.1</th>
<th>Investigate the functions of roots in plants.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.2</td>
<td>Identify the parts of a root.</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Differentiate the two major types of root systems.</td>
</tr>
<tr>
<td>2.2.4</td>
<td>Investigate specialized structures in roots.</td>
</tr>
<tr>
<td>2.2.5</td>
<td>Investigate the functions of roots in plants.</td>
</tr>
</tbody>
</table>

Performance Standard 2.3: Stem Anatomy

<table>
<thead>
<tr>
<th>2.3.1</th>
<th>List the functions of a stem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.2</td>
<td>Recognize the external structures of a stem.</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Analyze the internal structures of a stem cell.</td>
</tr>
<tr>
<td>2.3.4</td>
<td>Investigate specialized structures in stems.</td>
</tr>
</tbody>
</table>

Performance Standard 2.4: Leaf Anatomy

<table>
<thead>
<tr>
<th>2.4.1</th>
<th>Name the main parts of a leaf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4.2</td>
<td>Compare common vein patterns found in leaves.</td>
</tr>
<tr>
<td>2.4.3</td>
<td>List three functions of a leaf, including photosynthetic energy conversion.</td>
</tr>
<tr>
<td>2.4.4</td>
<td>Differentiate major leaf arrangements.</td>
</tr>
<tr>
<td>2.4.5</td>
<td>Investigate specialized cell structures in a leaf.</td>
</tr>
</tbody>
</table>

Performance Standard 2.5: Flower Anatomy

<table>
<thead>
<tr>
<th>2.5.1</th>
<th>Label and describe the parts of a flower.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5.2</td>
<td>Summarize the purpose of a flower.</td>
</tr>
<tr>
<td>2.5.3</td>
<td>Distinguish between different types of flowers.</td>
</tr>
<tr>
<td>2.5.4</td>
<td>Describe the difference between monocot and dicot flowers.</td>
</tr>
<tr>
<td>2.5.5</td>
<td>Diagram the process of plant pollination and fertilization.</td>
</tr>
</tbody>
</table>

Performance Standard 2.6: Fruit Anatomy

<table>
<thead>
<tr>
<th>2.6.1</th>
<th>Label and describe the parts of a fruit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6.2</td>
<td>Identify and distinguish between basic types of fruits.</td>
</tr>
</tbody>
</table>
### Performance Standard 2.7: Seed Anatomy
- 2.7.1 Identify and list the major parts of a seed.
- 2.7.2 List the function of each major part of a seed.

### CONTENT STANDARD 3.0: PLANT PHYSIOLOGY
#### Performance Standard 3.1: Energy Conversion In Plants
- 3.1.1 Interpret the process of photosynthesis.
- 3.1.2 Interpret the process of respiration.
- 3.1.3 Compare the process of respiration to photosynthesis.

#### Performance Standard 3.2: Transport Within a Plant System
- 3.2.1 Compare the active and passive transport of minerals into and through the root systems to plant nutrition.
- 3.2.2 Compare the structure and function of xylem and phloem cells and tissues.
- 3.2.3 Describe the process of translocation.

#### Performance Standard 3.3: Environmental Requirements for Plant Growth
- 3.3.1 Examine the effects of light quality on plant growth (i.e., spectrum, light measurement).
- 3.3.2 Examine the effects of water quality on plant growth (i.e., pH, hardness).
- 3.3.3 Examine the effects of temperature on plant growth.

#### Performance Standard 3.4: Plant Growth Regulators
- 3.4.1 Compare the functions of plant hormones.
- 3.4.2 Examine commercial uses for plant growth regulators.

#### Performance Standard 3.5: Plant Tropisms
- 3.5.1 Investigate plant tropisms (e.g., photo, thigma or gravi-).

### CONTENT STANDARD 4.0: PLANT IDENTIFICATION SKILLS
#### Performance Standard 4.1: Categorize Plants
- 4.1.1 Discuss the classification and naming of plants.
- 4.1.2 Distinguish the major groups of plants.
- 4.1.3 Correctly categorize common plants by life cycle (i.e., annuals, perennials, etc.).
- 4.1.4 Correctly categorize plants by growth habits (i.e., mounding, trailing, etc.).
- 4.1.5 Utilize resources to establish plant suitability for a selected site (i.e., Hardiness Zone Maps, Heat Zone Maps).
- 4.1.6 Identify common plants by botanical and common names.

### CONTENT STANDARD 5.0: GROWING MEDIA
#### Performance Standard 5.1: Soil Texture and Structure
- 5.1.1 List the components of soil.
- 5.1.2 Describe the concept of soil texture and its importance.
- 5.1.3 Classify the texture of a soil sample.
- 5.1.4 Identify various soil structures, their formation, and importance in agriculture production.
### Performance Standard 5.2: Soilless Growing Media

5.2.1 Identify the components and source of soilless growing media.
5.2.2 Describe the functions of growing media.
5.2.3 Determine desirable properties of growing media (i.e., drainage, organic matter, microorganisms).
5.2.4 Evaluate the advantages and disadvantages of soilless media.

### Performance Standard 5.3: Chemical Characteristics of Growing Media

5.3.1 Test and determine pH level of various growing media.
5.3.2 Interpret pH test results of a growing media sample.
5.3.3 Test and determine the electrical conductivity (EC) of various growing media.
5.3.4 Interpret EC test results of a growing media sample.
5.3.5 Interpret soil test results and make recommendation accordingly.
5.3.6 Analyze the relationship between soil media and nutrient availability.

### Performance Standard 5.4: Water-Holding Capacity (WHC)

5.4.1 Describe water-holding capacity of soils and its relationship to the water cycle.
5.4.2 Explain what determines a soil’s water-holding capacity.

### CONTENT STANDARD 6.0: PLANT NUTRITION

#### Performance Standards 6.1: Fertilizer Formulation

6.1.1 Differentiate between macronutrients and micronutrients.
6.1.2 Measure pH and describe how it is modified.
6.1.3 Identify the components of a fertilizer and their role in the biochemical cycle.
6.1.4 Interpret a fertilizer label.
6.1.5 Categorize methods of application (i.e., granular, time released, injector, foliar).
6.1.6 Evaluate application methods to ornamental crops.
6.1.7 Develop a fertilizer management plan for an ornamental crop.

#### Performance Standards 6.2: Plant Nutrients

6.2.1 Correlate plant symptoms to the appropriate nutritional deficiency.
6.2.2 Correlate plant symptoms to the appropriate plant toxicity.

### CONTENT STANDARD 7.0: INTEGRATED PEST MANAGEMENT (IPM)

#### Performance Standard 7.1: Integrated Pest Management

7.1.1 Define Integrated Pest Management (IPM).
7.1.2 Summarize the benefits of IPM.

#### Performance Standard 7.2: Common Pests and Diseases

7.2.1 Identify types of plant pests and diseases.
7.2.2 Identify weed, insect, rodent, and fungi pests.
7.2.3 Differentiate between infectious and noninfectious diseases.
7.2.4 Identify abiotic plant injuries.
### Performance Standard 7.3: Safe Handling, Use, and Storage of Pesticides

- 7.3.1 Identify and utilize appropriate safety measures when applying pesticides.
- 7.3.2 Interpret pesticide labels.
- 7.3.3 Explain procedures for storing and disposing of pesticides.
- 7.3.4 Evaluate environmental and consumer concerns regarding pest management and biodiversity.
- 7.3.5 Demonstrate how to mix pesticides according to label directions.
- 7.3.6 Calibrate common application equipment and calculate application rate.
- 7.3.7 Explore requirements for obtaining pesticide applicator licenses.

### CONTENT STANDARD 8.0: PLANT PROPAGATION

#### Performance Standard 8.1: Sexual Propagation of Ornamental Plants

- 8.1.1 Compare the difference between sexual and asexual propagation.
- 8.1.2 Diagram the process of seed germination.
- 8.1.3 Identify the conditions needed for seed germination.
- 8.1.4 Compare the methods of seed preparation.
- 8.1.5 Demonstrate techniques for sowing seeds.
- 8.1.6 Determine germination percent.

#### Performance Standard 8.2: Asexual Propagation of Ornamental Plants

- 8.2.1 Summarize optimum conditions for asexual propagation.
- 8.2.2 Demonstrate techniques used to propagate plants by cutting.
- 8.2.3 Demonstrate techniques used to propagate plants by division.
- 8.2.4 Demonstrate techniques used to propagate plants by separation.
- 8.2.5 Demonstrate techniques used to propagate plants by layering.

### CONTENT STANDARD 9.0: ORNAMENTAL HORTICULTURE CROPS

#### Performance Standard 9.1: Crop Production

- 9.1.1 Plan a growing schedule to maximize the production of a growing facility.
- 9.1.2 Utilize best management practices when spacing crops.
- 9.1.3 Select appropriate containers and medium for a crop.

#### Performance Standard 9.2: Growth Maintenance Procedures

- 9.2.1 Compare and contrast hard and soft pinches.
- 9.2.2 Pinch plants using best management practices.
- 9.2.3 Examine proper pruning techniques.
- 9.2.4 Demonstrate proper watering techniques.
- 9.2.5 Develop a plant lighting schedule for a crop.
- 9.2.6 Develop a fertilizer schedule for a crop.

#### Performance Standard 9.3: Transplanting

- 9.3.1 Identify the proper stage of plant growth for transplanting.
- 9.3.2 Select appropriate plants for transplanting.
- 9.3.3 Demonstrate transplanting procedures to industry standards.
Performance Standard 9.4: Production Standards

9.4.1 Compare hardening processes
9.4.2 Prepare plants for sale using best management practices.
9.4.3 Examine current industry crop standards (i.e. ANSI, ASNS, NALP).

CONTENT STANDARD 10.0: BUSINESS CONCEPTS

Performance Standard 10.1: Basics of Marketing

10.1.1 Compare and contrast advertising methods.
10.1.2 Define the purpose for developing a marketing plan.
10.1.3 Create a business display to a target market.

Performance Standard 10.2: Principles of Sales

10.2.1 Compare and contrast the relationship between marketing and selling.
10.2.2 Calculate markup.
10.2.3 Complete a sales ticket.
10.2.4 Complete a pre-sale and post-sale plant inventory.
10.2.5 Determine cost of sales.
10.2.6 Complete estimates and bids (cost analysis).
10.2.7 Identify the characteristics of an effective salesperson, and define related terms.
10.2.8 Analyze the customer buying process.
10.2.9 Identify the steps involved in the selling process.
10.2.10 Identify the benefits of different types of sales, including website and e-commerce.
10.2.11 Assess the basic components and content of a business website.

CONTENT STANDARD 11.0: PLANT TECHNOLOGIES

Performance Standard 11.1: Selective Plant Breeding

11.1.1 Describe the selective plant breeding process.
11.1.2 Explain how to estimate the heritability of certain traits.
11.1.3 Predict the genotypes and phenotypes from monohybrid and dihybrid crosses using a Punnett Square.
11.1.4 Describe sex determination, linkage, crossover, and mutation.
11.1.5 Describe how biotechnology tools are used to monitor and direct plant breeding.

Performance Standard 11.2: Genetic Engineering of Plants

11.2.1 Explain the advantages and disadvantages for genetic manipulation of plants.
11.2.2 Identify transgenic plants on the market.

Performance Standard 11.3: Micropropagation Techniques

11.3.1 Define micropropagation and its importance.
11.3.2 Explain applications of micropropagation.
11.3.3 Identify tools and materials for micropropagation procedures.
11.3.4 Describe procedures used in micropropagation.
Performance Standard 11.4: Hydroponic Techniques

11.4.1 Define hydroponics and its importance to society.
11.4.2 Explain applications of hydroponics.
11.4.3 Describe procedures used in hydroponic plant production.

CONTENT STANDARD 12.0: ORNAMENTAL DESIGN STANDARDS

Performance Standards 12.1: Principles and Elements of Design

12.1.1 Compare and contrast balance using symmetry, asymmetry, and massing.
12.1.2 Explain how the principles of dominance and focal point are used in design.
12.1.3 Determine appropriate proportion and scale in a design.
12.1.4 Illustrate how to establish rhythm in a design.
12.1.5 Discuss relationship of color to emotions/symbolism.
12.1.6 Use color, texture, and form to create a desired atmosphere.

Performance Standard 12.2: Implementation of Principles and Elements of Design

12.2.1 Create a project using principles and elements of design.
12.2.2 Justify design choices of finished project.

CONTENT STANDARD 13.0: CAREER OPPORTUNITIES IN ORNAMENTAL HORTICULTURE

Performance Standard 13.1: Careers in Ornamental Horticulture

13.1.1 Research potential careers in ornamental horticulture and plant science.
13.1.2 Demonstrate employability skills for a career in the ornamental horticulture industry.
13.1.3 Research additional industry certifications available.

CONTENT STANDARD 14.0: LEADERSHIP TRAINING THROUGH AGRICULTURAL EDUCATION

Performance Standard 14.1: Effective Leadership and Leadership Training

14.1.1 Expand leadership experience by participating in a chapter activity.
14.1.2 Participate in a career development event at the local level or above.
14.1.3 Exhibit leadership skills by demonstrating proper parliamentary procedure.
14.1.4 Participate in a speech or presentation activity.

Performance Standard 14.2: School and Community Awareness

14.2.1 Participate in a school improvement or community development project.

CONTENT STANDARD 15.0: SUPERVISED AGRICULTURAL EXPERIENCE (SAE) AND AGRICULTURAL CAREER PREPARATION

Performance Standard 15.1: Maintain a Supervised Agricultural Experience

15.1.1 Accurately maintain SAE record books.
15.1.2 Investigate the proficiency award areas related to SAE program area.
15.1.3 Actively pursue necessary steps to receive higher degrees in FFA.