Unit 8: Plant Pathway
Greenhouse/Floral

Competency

1. Service customers

Performance Standard Condition
Competition will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when the learner:
• Becomes familiar with product lines and any applicable information to assist the customer in choosing a product
• Demonstrates customer service skills
• Greets and assists guests
• Uses effective sales techniques with customers such as focusing on customer needs and priorities
• Responds to dissatisfied guests
• Assists guests by telephone if applicable

Learning Objectives
• Research & list effective sales techniques
• Identify the steps of the selling process
• Name methods for making the initial approach in retail sales
• Identify product information in the use of selling
• Describe ways to determine customer needs
• List common objections to purchasing
• Explain how to address customer objections
• Explain how a theme might determine the types of products/services/events available

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

2. Process sales

Performance Standard Condition

**Competence will be demonstrated**
- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**
- Calculates total sale purchase, including taxes, accurately
- Accepts cash payments
- Accepts credit card transactions
- Gives customer correct change
- Thanks guests
- Operates a POS (point of sale) system and/or cash register
- Balances end of shift transactions

Learning Objectives

- Describe how to process cash and credit cards using a POS and cash register
- Demonstrate how to calculate and hand back cash change without a calculator
- Describe end of shift audit procedures
- Explain how sales are recorded for cash collected and paid out of a cash drawer
- Explain how cash banks are issued to cashiers
- Describe how cashiers turn in cash banks and prepare cash deposits
- Explain how cash banks and cashier cash deposits are reconciled

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

3. Assist to design crop plantings, displays, and/or floral arrangements

Performance Standard Condition

Competence will be demonstrated
• at the worksite
• while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when the learner:

DISPLAYS
• Constructs or assembles displays and display components
• Stocks and maintains displays
• Changes or rotates window displays, interior display areas, and signage to reflect changes in inventory, season, or promotion

CROP PLANTINGS
• Creates crop planting design plan based on past sales, customer requirements, and site capacity
• Utilizes design elements of line, form, texture, and color to express visual effect
• Determines plants, trees, hardscaping, moisture, fertilizer, soil, equipment and power requirements for crop
• Determines a crop planting design for seasonal displays of foliages, plants, and flowers
• Documents design elements and decisions made for crop growth
• Develops crop planting plan based on design

FLORAL DISPLAYS/BOUQUETS, ETC
• Assembles the required flowers into bouquets, boutonnieres, centerpieces, vases, wreaths, etc.
• Applies basic design principles to product
• Handles and arranges cut flowers appropriately

Learning Objectives
• List and define terms associated with nursery/floral design
• Identify design elements
• Discuss applications of art in horticulture and landscaping
• Discuss principles of design that form the basis for visual impression
• Define the categories of nursery plants
• List common hardscaping materials used in nurseries

DISPLAYS
• Explain how retail displays are used in marketing retail items
• Describe types of display arrangements

FLORALS
• Analyze the principles of floral design
• Explain how the concept of proportion, balance, dominance, focal point and rhythm are applied to floral design
• Explain how flowers incorporate space, depth, texture and color in floral design
• Distinguish between an annual and a perennial
• Describe how to design a flower garden
• Describe proper handling and preparation of cut flowers
• Explain how to bundle cut flowers for bouquets, boutonnieres, vases, wreaths, etc.
• Describe the major forms used in floral design
• Identify cutting tools used in floral design
• Recognize floral design supplies for centerpieces, sprays, and vase arrangements
• Describe floral design supplies for corsages, bouquets, and boutonnieres
• Describe designing with everlasting plant materials (dried and silk)

Comments:
Competency
4. Implement crop planting plan

Performance Standard Condition
Competition will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when the learner:
• Reviews the planting and safety procedures
• Adjusts and calibrates any equipment according to facility requirements
• Wears any required Personal Protective Equipment (PPE)
• Prepares planting spaces
• Prepares soils/media
• Plants seeds, seedlings, or cuttings
  o Grows liners from seed
  o Grows liners from cuttings
  o Grows liners from divisions
  o Sows grass seed or plants plugs of grass
• Transplants liners
• Monitors crop plantings
• Mixes fertilizers and additives
• Applies fertilizers
• Pinches crop plantings as required
• Spaces crop plantings
• Forces bulbs
• Transplants to pots
• Harvests flowers

Learning Objectives
• Contrast the different types of nursery facilities
• Demonstrate how the plant-hardiness zone map and the plant heat-zone map are used
• Describe automated systems involved in planting
• Describe the process of lining out nursery stock
• Examine the field practice schedules for different types of plants
• Describe the process of flowering, pollination, fertilization and fruit development in plants in general
• Explain the role of the shoot in propagation, branching and plant form
• Compare development of grassy versus broad leaf plants
• Compare sexual and asexual propagation
• Distinguish between bulbs, corms, tubers, and rhizomes
• Discuss production practices used in growing foliage plants in the greenhouse
• Explain practices used in caring for foliage plants in the home or office
• Examine the factors involved in getting bedding plants started
• Explain production practices used in growing bedding plants
• Discuss the factors involved in propagating perennials
• Examine production practices used in forcing perennial plants to flower
• Analyze when and how to harvest everlasting flowers
• Demonstrate the proper staking of a tree in the field

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

5. Assist to maintain and monitor crop plantings

Performance Standard Condition

**Competence will be demonstrated**
- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**
- Reviews the monitoring requirements for the particular crop planting
  **WATER**
- **Assists to install and maintain watering and/or irrigation systems**
- Calibrates watering equipment
- Applies correct amounts of water based on water holding capacity of media and crop water needs
  **GREENHOUSE ENVIRONMENT**
- Monitors temperature, light, humidity and air controls
- Adjusts as required for crop needs
  **OBSERVE**
- **Assists to regularly monitor crop plantings** growth and conditions
- Takes soil, media, and plant samples as required
- Scouts for weeds, insects and plant diseases
- Adjusts actions based on crop plantings conditions for pest spraying, irrigating, fertilizing, etc.
  **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).
- Documents actions taken and results of action

Learning Objectives

- Identify basic principles of plant monitoring and management of common horticultural crops in nurseries
- Describe methods of heating greenhouse structures
- Contrast major greenhouse cooling and ventilation systems
- Discuss how energy curtains are used to maintain greenhouse temperatures
- Discuss the advantages of automated systems
- Identify automated systems involved in moving plants in the greenhouse
- Compare automated systems involved in watering plants
- Describe proper sampling techniques used when monitoring nursery plants
- Examine the developmental stages of a common floral plant, and determine factors that affect each stage
- Examine the developmental stages of a common green plant, and determine factors that affect each stage
- Describe the process of scouting for weeds, insects, and plant diseases
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

6. Assist to prevent the spread of weeds, pests, and diseases

Performance Standard Condition

**Competence will be demonstrated**
- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**
- Reviews the pest reduction and safety procedures
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Identifies plant pests (e.g., insects, diseases, weeds, rodents)
- Determines pest management safety practices and methods to be used
- Implements pest control plan with appropriate treatments
- Documents pest identity and control actions taken

**INSECTS/RODENTS/DISEASES**
- Arranges for pesticide application or apply pesticide if licensed. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).

Learning Objectives

- Identify common weeds, insects, and diseases that affect greenhouse nurseries
- **PESTS**
  - Identify and describe types of pests
  - Describe how pests affect plants and cause economic losses
  - Define integrated pest management (IPM) and keys to a successful IPM program
  - Compare and contrast the methods used in IPM to control pest problems
- **PESTICIDES**
  - Define toxicity
  - Identify the major classifications of pesticides, and describe how they are used
  - Identify the information that should be included on the pesticide label
  - Identify the safety practices that should be followed when applying pesticides
  - Identify the environmental concerns involved with pesticide use
  - Explain pesticide persistence and its impact on the environment
- **WEEDS**
  - Define weed and explain how weeds affect crop plantings
  - Determine how vegetative characteristics are used to identify weeds
  - Identify common weeds in nursery production
  - Discover how weeds are spread
  - Describe methods of weed control
  - Describe the types of herbicides
- **INSECTS**
  - Identify and classify insects
• Identify insect damage signs
• Describe the biological characteristics of insects
• Compare and contrast the types of insect life cycles
• Explain how insects damage plants
• Describe methods of insect control
• Describe the types of insecticides

DISEASES
• Identify and describe the agents that cause infectious and non-infectious plant diseases
• List conditions that are necessary for disease problems
• List and describe common plant diseases caused by bacteria
• Examine methods used to control bacterial diseases
• Describe how fungi diseases are spread
• Examine methods used to control diseases caused by fungi
• List and describe common plant diseases caused by fungi
• Identify symptoms associated with fungi diseases
• Describe common viral plant diseases
• Identify symptoms of viral diseases
• Describe how viral diseases are spread
• Examine methods used to control viral plant diseases

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

7. Perform sanitization procedures

Performance Standard Condition

**Competence will be demonstrated**
- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**
- Reviews the sanitization and safety procedures
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Regularly and thoroughly cleans floor of soil, organic matter and weeds
- Installs physical weed mat barriers on dirt and gravel floors
- Disinfects benches and bench tops
- Discards old OR disinfects reusable pots, flats and trays
- Cleans hose ends and stores hose ends off the ground
- Verifies growing media is covered and area is clean
- Cleans media mixing area routinely of plant material, contaminated pots, and used media
- Disinfects the growing and plant holding area
- Disinfects the irrigation system

Learning Objectives
- List common plant diseases found in nursery environments
- Describe the importance of a nursery sanitation plant
- Discuss the timing and cleaning schedule for sanitation at your facility to prevent diseases
- Describe factors that contribute to a microbe friendly environment in a nursery
- Explain the best times to conduct sanitation procedures in a nursery/greenhouse
- Discuss common disinfectants and sanitizers used in greenhouse nurseries
- Describe how to manage algae and other fungi
- Explain how improper watering can lead to algae growth
- Explain the process for cleaning irrigation systems
- Explain why wood structures are not recommended in greenhouse nurseries

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

8. Prepare, sort, and store products

Performance Standard Condition

**Competence will be demonstrated**
- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**
- Reviews the product preparation requirements
- Sorts through the product and remove damaged or diseased product immediately if required
- Confirms that products conform to specified requirements
- If applicable, processes and grades the product prior to shipments for sale or further processing
  - Cuts, rolls and stacks sod
  - Dips cut flowers, counts into bunches and ties
  - Wraps plant, tree, shrub roots
  - Harvests plants and pot
- Stores product as required for humidity, temperature and in appropriate containers for maximum storage life
- Documents inspection, sorting and storage activities

Learning Objectives
- Compare storage requirements for different plantings
- Describe techniques for inspecting, grading, handling and storing nursery crops for distribution
- Demonstrate the process of grading with a caliper
- Describe the types of storage used for nursery stock
- Describe the techniques used in the defoliation of plants before storage
- List and describe the problems that might occur to plants in storage
- Compare processing techniques for cut flowers, potted plants, trees/shrubs, and grass/sod
- Describe factors that influence plant quality in storage including temperature, moisture, aeration, pests, handling and length of storage
- Explain the basic requirements of cut flowers
- Understand the causes of deterioration and death of flowers
- Describe the steps of effective conditioning of flowers and foliage
- Explain the importance of using floral preservatives

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

9. Fill and package orders

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Reviews the packaging and safety procedures for inspecting and sorting
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Determine storage location of items needed
- Pulls items from storage location
- Verifies item pulled matches description and location of item required
- Notifies appropriate worksite professional of any discrepancies
- Prioritizes orders to be filled based on order plan
- Folds and prepares boxes for packaging
- Follows packaging plan for crop plantings into flats, trays and boxes
- Uses packaging methods that keep returns and claims for damage to a minimum
- Verifies that outgoing labels have all relevant information
- Confirms numbers of crop plantings packaged
- Checks container to verify that packing has proper labeling and meets shipping and safety regulations
- Notifies worksite professional when defective contents are identified
- Prepares packing slip
- Compares packing slip to order and materials to be shipped
- Resolves any discrepancies

Learning Objectives

- Compare different storage and packing areas and their function
- Describe common labels used on crops to be readied for packaging
- Demonstrate the use of scanners and scales for inventory management and counting
- List common markings found on cartons/containers
- Explain basic guidelines for labeling
- List common types of information on a packing slip
- Examine commercial packing and shipping
- Explain the methods of preserving plant materials
- Differentiate the three types of packaging of nursery crops
- Discuss the advantages and disadvantages of bare root, balled-and-burlapped, and containerized packaging
- Describe how to ball-and-burlap stock properly

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

10. Load product for sale, delivery, or further distribution

Performance Standard Condition
   Competence will be demonstrated
   • at the worksite

Performance Standard Criteria
   Performance will be successful when the learner:
   • Identifies and adheres to all related safety standards/regulations
   • Loads orders safely
   • Uses any loading equipment safely and according to regulations
   • Determines load capacities of transport vehicle
   • Loads transportation equipment according to load capacity
   • Packs transportation vehicles to ensure no damage to shipment
   • Secures load
   • Checks load
   • Verifies destination
   • Documents loading and transport of product as applicable
   • Updates inventory records as required

Learning Objectives
   • Describe safety processes for loading, transporting and unloading
   • List the regulations pertaining to loading/unloading of materials and supplies
   • Describe different kinds of loading equipment and their applicable safety and regulatory use standards
   • Discuss the function of verification at the loading/shipping stage
   • Explain how loading plans are created for different types of transportation equipment
   • List common types of transportation vehicles used for different types of nursery crops
   • Describe storage conditions for transportation required for the nursery crops you work with
   • Explain the importance of efficient transportation of nursery crops
   • Compare processes for transporting and unloading different types of nursery crops

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency
11. Assist to maintain facility & equipment

Performance Standard Condition
**Competence will be demonstrated**
- at the worksite
- while assisting a worksite professional

Performance Standard Criteria
**Performance will be successful when the learner:**
**PREVENTATIVE MAINTENANCE (PM)**
- Performs routine preventative maintenance (PM) according to facility schedule
- Communicates scheduled PM to management
- Assures that alternative equipment is available if needed
- Gathers supplies to perform PM
- Ensures that equipment is properly labeled and pulled from use
- Follows appropriate Lock Out/Tag Out procedures prior to performing PM
- Follows all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required
- Assists worksite professional to follow PM schedule to calibrate and maintain equipment, tools and workstations
- Assists worksite professional to re-qualify equipment for operation
- Cleans up area after PM
- Documents preventative actions taken

**REPAIR**
- Assures that alternative equipment is available if needed
- Consults worksite professionals, maintenance manuals, and equipment history to diagnose possible equipment problems
- Gathers supplies to perform repair
- Ensures that equipment is properly labeled and pulled from use
- Follows appropriate Lock Out/Tag Out procedures prior to performing repair
- Follows all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required
- Assists worksite professional to isolate system and component failure and to repair equipment problems
- Assists worksite professional to identify root cause of problem and develop corrective action plan
- Assist worksite professional to re-qualify equipment for operation
- Cleans up area after repair
- Documents repairs completed
- Evaluates repair work through follow up

**FACILITY**
- Reviews procedures for constructing or repairing facility structures
- Ensures utility companies have pre-marked locations of buried utility lines if required
• Wears the appropriate Personal Protective Equipment (PPE)
• Prepares base if needed
• Lays stone, concrete, hardscape material as required
• Builds or adds on the structural elements required
• Cleans equipment used

Learning Objectives
EQUIPMENT
• Differentiate the types of equipment used in nurseries
• Identify the cutting and digging equipment used in nurseries
• Describe the tillage and soil-moving equipment used in nurseries
• Describe how diagrams schematics, equipment manuals, and equipment specifications to determine the schedule and process for PM
• Describe how diagrams schematics, equipment manuals, and equipment specifications to determine repair
• Describe the most common causes of tool/equipment failure in your facility
• Compare what equipment and equipment material are recyclable and what is not at your facility
• Evaluate methods for equipment maintenance and repair to avoid downtime
• Compare repairing on site to securing a technician from off-site
• List factors to consider in selecting a technician
• List the factors involved with preventive maintenance (time, cost) and emergency repair (downtime, cost)

FACILITY
• Differentiate greenhouse designs
• Identify and describe greenhouse glazing materials
• Describe the functions of the headhouse
• Describe greenhouse bench options
• List common types of facility and structure projects
• List common equipment used in facility and structure projects
• Describe the process for preparing a common hardscape base
• Compare the types of materials used in paving
• Explain common steps and warnings for working with concrete
• Describe how to install a walkway
• Discuss how to properly install a fence
• Describe the different materials used to build a retaining wall
• Explain how to install a retaining wall
• Identify the major lighting techniques available for the nursery
• Explain the difference between high and low voltage
• Describe the proper installation of low-voltage lighting systems
• Identify the different materials needed to create a water feature
• Describe the proper technique for creating a small pond
• Explain how to construct a waterfall feature

Comments:
Unit 8: Plant Pathway
Greenhouse/Floral

Competency

12. Sharpen hand tools

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Checks blades regularly as required
- Reviews sharpening procedure and edge bevel angle required for hand tool
- Wears appropriate PPE
- Removes surface rust and dirt
- Sands any splintered tool handles
- Replaces or tightens broken or loose tool handles
- Uses an appropriate file or stone to sharpen nicked or dull tools
- Moves file away from and diagonally across the sharp edge to maintain the factory bevel
- Consults manual for sharpening tools with serrated edges
- For bow saws, uses a triangular file to sharpen both sides of each saw’s teeth to the appropriate bevel
- Hones and maintains sharp edges of all cutting tools with a sharpening stone
- Periodically wipes tools with a light oil on metal parts for corrosion protection

Learning Objectives

- Discuss the types of digging and grading hand tools and their uses
- Explain the major types of pruning and cutting hand tools and their uses
- Discuss common shop hand tools used in horticulture
- List common hand tools in landscaping that require sharpening
- Discuss how to determine the correct sharpened bevel angle for a cutting tool
- Explain how serrated edges are sharpened
- Compare sharpening tools such as file and stones
- Discuss when to use which type of sharpening tool
- Demonstrate the process for sharpening

Comments: