Appendix N

AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR)
YOUTH APPRENTICESHIP

PLANT PATHWAY
PLANT BASICS UNIT
UNIT 6

Unit 6: Plant Pathway
Plant Basics

Competency
1. Prepare planting spaces

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Makes site measurements
- Evaluates site for easements, setbacks, etc, if applicable
- Ensures utility companies have pre-marked locations of buried utility lines
- Produces maps using drawings, surveys, CAD, and/or geospatial computerized applications
- Obtains appropriate soil/media OR ***prepare current soil***
- Prunes or trims around space to allow for appropriate lighting and air circulation
- Removes sticks, stones, and other trash
- Removes plant debris that may harbor insects and diseases
- Tills current soil
- Levels site
- Takes soil sample to determine fertilizer needs

Learning Objectives

- Describe the various uses of plants in everyday life
- Identify important types of plants and explain their uses
- Identify land use management regulations
- Compare local land use management systems

EROSION & DEGRADATION

- Describe soil degradation
- Identify sources of soil degradation
- Examine management strategies that limit soil degradation
- Define soil erosion
- Identify the causes of soil erosion
- Explain the ways in which different types of wind erosion occur and the associated problems
- Distinguish between the different types of water erosion
- Discuss erosion control methods

Comments:

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Plant Basics

Competency
2. Prepare soils/media

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Collects sample from soil or media
- Tests soil/media OR send sample for testing
- Evaluates soil/media permeability and water-holding capacity
- Interprets tests of soil/media with worksite professional
- *Assists to* develop planting and fertilization plan with worksite professional based on plants to be grown
- Plows or tills or turns soil to appropriate depth
- ***Mixes fertilizers and additives***
- ***Applies fertilizers***

Learning Objectives

- List major soil components and types
- Explain how soil structure, texture, pH and salinity affect plant growth
- Describe organisms found in soil and their benefits to the soil
- Describe the ways plants use soil
- Identify soil formation factors
- Describe how time and weathering affect properties of soil
- Examine how climate affects the development of soil
- Analyze soil/media limitations related to crop production, greenhouse production and/or landscape utilization
- Explain moisture-holding capacity
- Explain what determines a soil's moisture-holding capacity
- Examine the difference between soil, soil-less media and hydroponics
- Examine the effects of media components on plant growth

Comments:

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Competency
3. Plant seeds, seedlings, or cuttings

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Obtains seeds, seedlings, or cuttings to be planted
- Removes any plastic or paper pots
- Cracks peat pots
- Determines spacing of plants
- Add seeds, seedlings, or cuttings as required to appropriate depths
- Adds any nutrient mix or solution as required
- Covers with fine soil/media
- Waters generously with a gentle spray or mist
- Stores or discards any leftover seed as required

Learning Objectives

PLANT BASICS

- Describe the components of a plant cell and explain their functions
- Identify and describe the basic types of plant cells
- Define basic Mendelian principles: dominance, recessive, incomplete dominance, etc.
- Discuss the importance of improved organisms in agriculture
- Identify methods used in agriscience to improve organisms
- Describe plant taxonomy and hierarchical classification
- Explain plant nomenclature

ROOTS

- Describe the parts and functions of roots
- Explain root growth
- Describe how roots absorb water and nutrients
- Recognize the characteristics of a healthy root system

STEMS

- Describe the parts and functions of a stem
- Compare types of specialized stems
- Explain factors involved in translocation

LEAVES

- Identify the parts and functions of leaves
- Identify and describe the patterns of leaf arrangement

FLOWERS

- Identify the parts of flowers and explain their functions
- Compare and contrast types of flowers

FRUIT

- Define fruit and describe its functions
- Compare and contrast the basic types of fruits
- Describe fruit development
- Identify the parts of a fruit
- Describe how seedless fruits are produced

SEEDS

- List the parts of a seed
- Describe the process of seed germination
- Discuss the conditions required for seed germination
- Explain the importance of seed quality

Comments:

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Competency
4. Monitor plants for light, moisture, and temperature requirements

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Periodically checks the planting spaces as required
- Prior to germination, keeps seeds thoroughly watered
- After germination, pulls any excess seedlings
- Waters during dry periods
- Covers during frost periods
- Controls weeds by pulling, mulching, etc.
- Monitors plants for insects and disease signs
- After harvesting, removes spent plant debris into compost

Learning Objectives

- Explain the growth processes of photosynthesis, respirations and transpiration

LIGHT

- Examine the role of chloroplasts and plant pigments in photosynthesis
- Analyze the major steps involved in photosynthesis
- Identify factors that affect photosynthesis
- Describe the role of the sun, sugar, oxygen, carbon dioxide, and water in photosynthesis
- Describe the effects of light quality, quantity and duration on plant growth

CELL RESPIRATION

- Describe the respiration process in the breakdown of food and organic matter
- Identify factors that affect cellular respiration

TEMPERATURE

- Discuss the effect of temperature on plant growth
- Describe plant responses to temperature
- Explain cardinal temperature range for growth and survival of common plants
- Explain plant hardiness and heat tolerance

MOISTURE

- Identify important characteristics of water
- Explain the hydrologic cycle
- Describe the functions of water in plant growth
- Explain plant responses to water shortage and to excess water

OTHER

- Compare annual, biennial and perennial life cycles
- Explain growing degree days
- Calculate growing degree days
- Explain the effects of humidity on plant growth

- Discuss the effects of air pollution on plant growth

Comments:

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Competency

5. Assist to install and maintain watering and/or irrigation systems

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:

- Determines irrigation requirements
- Verifies local building codes that must be followed
- Ensures utility companies have pre-marked locations of buried utility lines
- Reviews manufacturer procedures for the watering/irrigation system chosen
- Sketches or plans locations of watering heads in accordance with types of plantings, buried utility lines, plant irrigation needs, and existing property structures
- Determines water pressure from water source using a water pressure gauge
- Checks the flow rate by calculating gallons per minute or applicable
- Finds spacing of watering heads
- Determines number of watering heads based on head ratings and water source calculations
- Establishes sprinkler circuits and install valves
- Locates controllers and size wiring
- Installs and connects pipes, tubing, watering heads, etc. as required for the type of system
- Monitors and checks system periodically as required by facility or system manufacturer

Learning Objectives

- Compare water delivery and irrigation methods and options
- Determine the need for drainage and describe the benefits of tile drainage
- Examine subsurface drainage techniques and determine the equipment and types of pipe available
- Describe the benefits of irrigation
- Identify ways of determining the need of irrigation
- Describe irrigation scheduling
- Explain methods of water application
- Describe the efficient use of water
- Identify sources of soil water depletion
- Describe soil conditions conducive to artificial drainage
- Describe soil conditions conducive to irrigation
- Explain how watering systems are chosen based on planting space shape, type of plants, adaptability and cost
- List contaminants in water that come from agriculture
- Describe how agricultural practices affect drinking water quality

- Describe how agricultural chemicals and sediments move to off-site areas
- Explain how nitrogen and phosphorus affect surface and ground water quality
- Explain the purposes of filter/buffer strips and riparian areas/tree plantings on water quality

Comments:

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Competency
6. Mix fertilizers and additives

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Determines the nutrient requirements based on soil report with worksite professional
- Calculates the proper amount and type of fertilizer to apply for the soil and type of plants to be grown with worksite professional
- Reviews the safety requirements for the mixing procedure
- Wears any appropriate PPE
- Obtains the appropriate equipment, supplies and fertilizers/additives
- Mixes the fertilizer ingredients in the appropriate ratios using the appropriate containers
- Labels fertilizer mixture
- Documents mixing process
- Cleans equipment
- Discards any excess disposable materials as required

Learning Objectives

- Define nutrient
- Discuss the role of the essential nutrients in plant growth
- Compare types, uses, and applications of fertilizers
- Identify non-fertilizer nutrients and describe their functions
- Identify macro and micronutrients and describe their functions
- Describe the meaning and importance of soil fertility
- Define pH and discuss its role in plant nutrition
- Describe environmental conditions that influence nutrient deficiencies
- Explain the development of a nutrient management plan
- Describe organic and inorganic fertilizers
- Explain fertilizer analysis, grade, and ratio
- Explain the mixing of fertilizers
- Describe the selection of fertilizers
- Identify classes of plant growth regulators
- Discuss how and why synthetic growth regulators are used
- Describe commercial uses of plant growth regulators

Comments:

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Competency
7. Apply fertilizers

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Checks the facility fertilization plan
- Determines the need for the application of fertilizer
- Mixes the fertilizers and additives
- Reviews any safety requirements for the application procedure
- Wears any appropriate PPE
- Obtains the appropriate equipment, supplies and fertilizers mixtures
- Identifies the most appropriate method of fertilizer application
- Determines the appropriate fertilizer application rate
- Fertilizes the plants as required
- Documents fertilization process
- Cleans equipment
- Discards or stores any excess fertilizer as required

Learning Objectives

- Examine the equipment and technology used to apply fertilizers
- Identify forms of nitrogen and describe their characteristics
- Identify and describe the symptoms of nitrogen deficiency and nitrogen toxicity
- Describe the nitrogen cycle and explain how it influences the availability of nitrogen to plants
- Identify plants capable of nitrogen fixation and describe factors that influence nitrogen fixation
- Identify and describe natural and synthetic fertilizer sources of nitrogen
- Identify the forms of phosphorus in soil
- Examine factors that affect phosphorus availability
- Identify and describe symptoms of phosphorus deficiency and phosphorus toxicity
- Identify and describe fertilizer sources of phosphorus
- Describe the availability of potassium to plants
- Identify and describe symptoms of potassium deficiency and potassium toxicity
- Identify and describe the fertilizer sources of potassium
- Identify the forms of calcium, magnesium, and sulfur in soil and identify their fertilizer sources
- Identify the fertilizer sources of micronutrients
- Identify and describe symptoms of nutrient deficiency and toxicity from secondary macronutrients and micronutrients

Comments:

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Competency
8. Manage inventory

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Checks incoming items for damage
- Verifies incoming items match purchase order and description
- Notifies appropriate parties and take corrective action when defective items are identified
- Monitors location of items
- Monitors inventory use for ordering levels
- Assists worksite professional to perform inventory checks
- Checks that proper inventory levels are maintained
- Rotates items to minimize old and outdated inventory
- Performs inventory counts
- Assists with inventory inaccuracies investigations
- Documents inventory activities

Learning Objectives

- Explain the purpose of an inventory plan
- Identify the costs of maintaining inventory
- List methods of productivity measurement and just-in-time inventory control
- Explain the importance of maintaining inventory levels to minimize inventory value
- Discuss the timing of inventory audits to production requirements
- Describe your facility's policy in the event of inventory shortage
- List examples of situations that indicate the need for a review of storage and retrieval systems to determine if upgrades and replacement are warranted

Comments:

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Competency
9. Maintain agribusiness records

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Selects appropriate forms/records
- Labels and/or codes documents as required
- Files forms/records in appropriate location
- Retrieves and replaces files in correct position
- Adds, Edits, Verifies and Queries data in electronic files if applicable
- Uses appropriate computer codes, formatting, macros, charts, spreadsheets, etc.
- Verifies data prior to entry/storage
- Maintains files as required

Learning Objectives

- Describe the functions of business records
- Identify common kinds of business records
- Define terms used in horticulture records
- Discuss common legal forms used in horticulture services
- Explain why record keeping is necessary to assess the current financial condition of a business and why it is helpful in planning and preparing for the future
- Identify and describe the characteristics of good record keeping
- Compare manual and electronic record keeping systems
- Demonstrate how electronic data is manipulated such as in a spreadsheet system
- Explain how data & files are stored and “backed up”
- Describe the purpose of security and ID information within record keeping systems

Comments:

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Competency
10. Evaluate the facility business and marketing plan

Performance Standard Condition

Competence will be demonstrated

- at the worksite OR in the classroom in a simulated setting
- NOTE: A simulated setting should ONLY be used IF there is no possibility of skill performance at the worksite

Performance Standard Criteria

Performance will be successful when the learner:

- Identifies the goals and objectives for the business
- Verifies records are kept and maintained on finances, production, plant health, harvest, and sales as required
- Identifies what products are for sale
- Identifies pricing goals
- Describes how product will be merchandised
- Evaluates cost of production
- Evaluates pricing opportunities (cash, futures, options)
- Evaluates pricing indicators (supply & demand)
- Reviews the strategy for evaluating and updating the marketing plan
- Identifies markets for selling products

Learning Objectives

- Define agribusiness and describe the sectors of agribusiness
- Identify and describe basic categories of resources, and explain why each is necessary to produce a product
- Explain factors that determine the ability of a business to start successfully
- List and explain the factors that typically contribute to the success and failure of agribusinesses
- Explain the purpose and importance of a business plan
- Describe the parts of a business plan
- Appraise and evaluate the economic value of certain crops and plants for various applications in the agriculture industry
- Review pricing methods
- Explain how to price that includes a reasonable return on investment
- Relate production size to costs
- Calculate various costs- planting, soils, fertilizers, watering, maintenance costs
- Define marketing and the marketing mix
- Define the purpose for developing a marketing plan
- Explain the essential elements of a marketing program
- List marketable plant products and byproducts
- Compare organic plant industry to traditional plant production

Comments: