

LESSON PLAN 12.1

COURSE TITLE: Plant Science
UNIT#: 12 **UNIT TITLE:** Plants in Managed Environments
LESSON: What are the features of a managed environment?

LEARNING OBJECTIVES:

Student will...

1. Determine the characteristics of a managed environment.
 2. Describe the features of various environments.
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SCIENCE CONCEPTS:

Nutrient cycles
Pollination

AG SCIENCE PRACTICES:

Designing Landscapes
Plant Selection
Growing Field Crops
Growing Plants Hydroponically

References, Learning resources, Materials, & Equipment

TEACHING PROCEDURE: (Attention focusing, Anticipatory Set, Interest Approach)

Activity: Show photo of an orchard?

Leading Questions:

Is this a managed environment? What makes this a managed environment?

How is it different from a rangeland or forest?

LESSON SEQUENCE:(demonstration, direct instruction, key questions, activity description, learning activities, procedure, discussion outline)

5 minutes: Take roll and announcements

5 minutes: Attention focuser

40 minutes: Class discussion

5 minutes: Closure of problem

PROBLEM SOLUTION:

Layout of the Plan...

K.Q. #1

What are the characteristics of a managed environment?

1. Specific variety of plant
2. Controlled environment
 - Soil pH
 - Water(if irrigated)
 - Soil type
 - Plant spacing
 - Elevation
 - Erosion

Examples:

Fruit: apples, strawberries

Vegetables: sweet corn, peas, green beans, carrots

Crops: corn, soybeans, wheat, barley, sugar beets, alfalfa

Floriculture: roses, impatiens, marigolds

Turf: Kentucky Bluegrass, Bermuda grass

3. Control of selected environment

Irrigation-Does rainfall amount in our area require irrigation?

Fertilizer-Nitrogen-What are of the nitrogen application zones for your area? Do you fall apply? What crops are you growing? Is it a legume that naturally favors nitrogen?

Phosphorus-What levels do you have in the soil test?

Potassium-What levels do you have in the soil test?

Pesticides/Insecticides- Identify key pest in your area and develop an economic threshold to damage of that pest.

Resistant Variety- Through genetic engineering and/or plant breeding, is there a variety that is resistant to insects or disease?

PROBLEM CONCLUSION AND/OR SUMMARY:

1. Review Key Questions-What are the characteristics of a managed environment?
What problems may be faced in a managed environment?

2. Review Activities

EVALUATION OF THE TEACHING/LEARNING PROCESS:

In this problem we have practiced...

HIGHER ORDER THINKING LEVEL (Identify levels with students)

Cognitive

6. Evaluation
5. Synthesis
4. Analysis
3. Application
2. Comprehension
1. Knowledge

Psychomotor

5. Naturalize
4. Articulate
3. Precision
2. Manipulate
1. Imitate

Affective

5. Characterized
4. Organize
3. Value
2. Respond
1. Receive

LESSON PLAN 12.2

COURSE TITLE: Plant Science

UNIT#: 12 UNIT TITLE: Plants in Managed Environments

LESSON: What factors are essential when growing fruit crops?

LEARNING OBJECTIVES:

Student will...

1. Describe seasonal changes.

2. Describe latitude changes and adaptation.

3. Describe elevation changes.

SCIENCE CONCEPTS:

Photosynthesis
Growing degree days

AG SCIENCE PRACTICES:

Pruning

References, Learning resources, Materials, & Equipment

Temperate Zone Pomology Physiology: Culture 3rd Edition, Melvin Veil Westwood

TEACHING PROCEDURE: (Attention focusing, Anticipatory Set, Interest Approach)

Activity: Brainstorming needs for growing a fruit variety.

Leading Questions:

What do we need to think about when growing a fruit variety?

LESSON SEQUENCE:(demonstration, direct instruction, key questions, activity description, learning activities, procedure, discussion outline)

5 minutes: Introduction/announcements/roll

5 minutes: Attention focuser

45 minutes: Lead class discussion

5 minutes: Closure

PROBLEM SOLUTION:

Layout of the Plan...

K.Q. #1

What is the impact of seasonal changes on fruit varieties?

Fall-

- a) Growth ceases
- b) Sheds leaves
- c) Acquire winter hardiness
 - Promotes decline
 - Inhibitors increase

ABA (Absisic Acid) inhibitor increases in the buds as day length decreases. Shoot growth stops, Auxin and Gibberellic Acid and Cytokinin are produced in less amounts. This induces winter rest (endodormancy).

Winter

- Endodormancy (winter rest) is removed naturally by winter chilling. (This varies because of species and type of winter).
- Specifically for higher latitudes.
- Short to moderate chilling requirements.
- Because winters are continuously below freezing, chilling requirement is not met until late winter, early spring.

Spring

- Plants adapt to a specific climate.
- Respond by flowering and starting growth.

Summer

Young trees tend to grow the entire summer.

Mature trees usually grow in early summer after which terminal buds form . The remainder of growth is root and fruit growth.

K.Q. #2

What ways does latitude affect a fruit variety?

From zero degrees latitude, winters get progressively colder and longer. The higher the latitude, the longer the summer days, and the shorter the winter days.

- A species must be genetically attuned to the latitude.

K.Q. #3

What are ways elevation affects fruit species?

As the elevation increases, the temperature gets colder. For winter chilling, high elevations in low latitudes do not provide the changes in day length needed by some species to initiate flowers or to enter endodormancy.

PROBLEM CONCLUSION AND/OR SUMMARY:

- Name three things that affect selecting an area for fruit production.
- How does the change in seasons affect plant growth?

1. Review Key Questions.
2. Review Activities

EVALUATION OF THE TEACHING/LEARNING PROCESS:

In this problem we have practiced...

HIGHER ORDER THINKING LEVEL (Identify levels with students)

Cognitive	Psychomotor	Affective
6. Evaluation	5. Naturalize	5. Characterized
5. Synthesis	4. Articulate	4. Organize
4. Analysis	3. Precision	3. Value
3. Application	2. Manipulate	2. Respond
2. Comprehension	1. Imitate	1. Receive
1. Knowledge		

STUDENT EXERCISES/EXPERIMENTS/ACTIVITIES

NAME: _____

TITLE: Propagating Fruit in a Managed Environment**FOCUS QUESTION:** How are fruit species propagated?**OBJECTIVES:**

Define:

Propagation

Cuttings

Budding

Grafting

Root Stock

STUDENT PREDICTION:

Can rootstock clones or scion varieties be propagated from seeds?

INTRODUCTION:

What is propagation?

Asexual-cuttings on a rootstock.

Sexual-seeding to obtain rootstock that will be used in grafting.

SCIENCE CONCEPT(S):

Budding

Grafting

Cuttings

Root stock

Whip graft

Cleft graph

MATERIALS NEEDED:

Rootstock

Bud or whip graphs

Saw

Mallet

Grafting tool

Grafting knife

Wrapping material

Grafting wax

Auxin IBA (dip cuttings in 1000-5000ppm for 5 seconds)

LEARNING ACTIVITIES/PROCEDURE(S):

Grafting

1. Select a root stock and scion for cutting.
2. Cut rootstock flat. Use large knife and mallet to split rootstock.
3. Trim scion to a "V" shape on the lower end.
4. Place the scion with all cambium layers even.
5. Spread the root stock open and place the scion (two, one on each side) into the trunk. Make sure all layers of bark are touching.
6. Seal the trunk and around the scion with melted grafting wax.

STUDENT SUMMARY/CONCLUSION/RECOMMENDATIONS/REFLECTION:

1. Were your predictions correct? Why or why not?

2. What tools are needed to graft?

3. What is the goal of grafting?

LESSON PLAN 12.3

COURSE TITLE: Plant Science

UNIT#: 12 UNIT TITLE: Plants in Managed Environments

LESSON: What are the features of growing vegetables in a controlled environment?

LEARNING OBJECTIVES:

Student will...

1. Classify vegetables by edible parts.
2. Determine how to establish a crop (two ways).
3. Plant growth and development.

SCIENCE CONCEPTS:

Photosynthesis
Pollination
Replication

AG SCIENCE PRACTICES:

Classify vegetables
Fruit set

References, Learning resources, Materials, & Equipment

Producing Vegetable Crops: 4th Edition Swader/Ware/McLeoum

TEACHING PROCEDURE: (Attention focusing, Anticipatory Set, Interest Approach)

Activity: Opening Discussion

Leading Questions:

What is vegetable? Is a tomato a vegetable? How do we classify them?

LESSON SEQUENCE:(demonstration, direct instruction, key questions, activity description, learning activities, procedure, discussion outline)

5 minutes: Introduction/announcements/roll

5 minutes: Attention focuser

45 minutes: Lead class discussion

5 minutes: Closure

PROBLEM SOLUTION:

Layout of the Plan...

Key Question #1

What is one way of classifying vegetables?

1. Botanical Family
2. Edible part:
 - Root (beets, carrots, sweet potatoes)
 - Stem (asparagus, potatoes-tubers)
 - Leaf (cabbage, celery, lettuce, spinach)
 - Immature flower part (broccoli, cauliflower)
 - Immature fruit (peas, cucumber, soybeans)
 - Mature fruit (peppers, melons, tomatoes)
3. Temperature Requirements:
 - Cool Season
 - Warm Season
4. Life Cycle:
 - Perennial
 - Biennial
 - Annual

Key Question #2

How do we establish a vegetable crop?

1. Direct Seeding
 - use certified seed
 - select for hybrid vs. open pollinated cultivars
 - germination depends on:
 - moisture
 - oxygen
 - temperature
 - light
2. Transplanting
 - Extends a short growing season
 - Improved land use efficiency
 - Save on the cost of seeds
 - Requires less irrigation

PROBLEM CONCLUSION AND/OR SUMMARY:

1. Review Key Questions.
2. Review Activities

EVALUATION OF THE TEACHING/LEARNING PROCESS:

In this problem we have practiced...

HIGHER ORDER THINKING LEVEL (Identify levels with students)

Cognitive

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STUDENT EXERCISES/EXPERIMENTS/ACTIVITIES**NAME:** _____**TITLE:** Growing Vegetables in a Managed Environment**FOCUS QUESTION:** How are vegetables grown in a managed environment?**OBJECTIVES:**

- Determine proper spacing for a given plant.
- Determine proper moisture for a given plant.
- Determine proper temperature for a given plant.

STUDENT PREDICTION:

How does plant spacing, moisture, and temperature affect direct seeding vs. transplanting?

INTRODUCTION:

How do we select spacing for a specific vegetable crop? Does plant height, growth rate, plant variety, and plant zone affect spacing, moisture, and temperature.

SCIENCE CONCEPT(S):

- Plant spacing
- Moisture requirements
- Temperature requirements
- Growing Degree Days

MATERIALS NEEDED:

- Greenhouse (or other controlled environment)
- Seeds (corn, edible beans, tomato)
- Seedlings (preferably the same as the seeds)
- Thermometer
- Measuring cup
- Rulers
- Growing trays

LEARNING ACTIVITIES/PROCEDURE(S):

1. Set up the experiment using at least three different repetitions: All three repetitions will use seeds and transplants.
 - A. Spacing 1/2 inch apart with 6" rows.
Moisture 1/8 inch per week.
Temperature 45 degrees F.
 - B. Spacing 1 inch apart with 10" rows.
Moisture 1/4 inch per week.
Temperature 65 degrees F.
 - C. Spacing 2 inches apart with 12" rows.
Moisture 1/2 inch per week.
Temperature 85 degrees F.

Taking records:

Record temperature, moisture, and plant growth twice a week.
Keep an accurate record.

STUDENT OBSERVATIONS/EVIDENCE ANALYSIS
(Data analysis, findings, questions)

1. What spacing allowed the most growth?
2. What temperature allowed the most growth?
3. What moisture level allowed the most growth?
4. What repetition allowed for the best results?

