

LESSON PLAN 10.1

COURSE TITLE: Plant Science

UNIT#: X UNIT TITLE: Plant Health (10 days)

LESSON: What are the features of various plant pests?

LEARNING OBJECTIVES:

Student will..

1. Define plant health.
 2. Identify plant pests in each category (insects, weeds, diseases).
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SCIENCE CONCEPTS:

Host
Life cycles
Pathology
Transmission

AG SCIENCE PRACTICES:

Entomology
Weed Identification
Disease Identification

References, Learning resources, Materials, & Equipment

Entomology & Pest Mgt. Pedigo 1989, Macmillan

Intro Crop Science Walden 1982, Burgess

Producing Veg Crops Swaider 1980, Interstate

Pomology, Melvin

Biology, Mader

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

Activity: Show examples of an: insect, weed, and disease.

Leading Questions:

What is a pest? (A species that interferes with human activity.)

What damage is caused by various pests in crops or plants? (Economical?, environmental?, biological?)

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

5 minutes: Intro (What is a pest?)

5 minutes: Attention focuser (What damage do pest cause?)

15 minutes: Supervised activity (Identification of pest categories)

15 minutes: Class discussion

10 minutes: Introduction of activities

5 minutes: Closure

PROBLEM SOLUTION:

Layout of the Plan...

K.Q. #1

What are common terms used in pest management?

- a) Host - An organism in or on which a parasite lives.
- b) Life cycle - The chain of events that occur during a lifetime of an individual organism.
- c) Pathology - The conditions, processes, or results of a particular disease.

K.Q. #2

Why is it important to identify pests?

- a) To develop control methods.
- b) Improve management techniques.
- c) Improve yields.
- d) Improve quality.

K.Q. #3

What are three categories of pests?

- a) Insects
- b) Weeds
- c) Diseases

K.Q. #4

What methods may be used to control pests?

- 1. Biological
- 2. Cultural
- 3. Mechanical
- 4. Genetic
- 5. Chemical

K.Q. #5

What are insects?

K.Q. #6

What are the parts of an insect that are common across all creatures labeled as insects?

K.Q. #7

What is a weed?

K.Q. #8

What is a plant disease?

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

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

STUDENT EXERCISES/EXPERIMENTS/ACTIVITIES

NAME: _____

TITLE: Grains that are most desirable for weevils!!**FOCUS QUESTION:**

What are the grains and their conditions that are most attractive to grain storage insects?
What grains do grain storage insects like the best? How does moisture of the grain affect insect growth and grain damage?

OBJECTIVES: Students will...

Determine the population growth of granary weevil on different grains of similar moisture.
Determine the effect of different moisture levels and room temperature versus refrigerator temperature on insect population dynamics and grain loss.

STUDENT PREDICTION:

- A. Will common grains such as barley, corn, oats, soybeans, and wheat all have the same attraction for insect growth while in storage? Which one will be greatest, which one will be least attracted to insect damage?
- B. What will be the effect of 8, 12, 16, and 20% grain moisture levels on room versus refrigerator temperature on insect damage in stored grain?
The greatest damage will occur in grains at 8%, 12%, 16%, 20%. (Circle one)
The greatest damage will occur in room or cold temperatures. (Circle best condition)

INTRODUCTION:

Storage insects annually account for 5-10% of all grain losses between harvest and consumption. Insects reduce market value via lowering the grain grades and can make grains unsuitable for human consumption. In this activity, you will be given an opportunity to understand the effects of grain (insect preference) and environment (temperature and moisture) on the level of insect damage on stored grain.

SCIENCE CONCEPT(S):

Selectivity
Host
Life cycles

MATERIALS NEEDED:

(18) 2-liter bottles
Grain samples of corn, barley, wheat, oats, soybeans
Access to a refrigerator
(90) Grain weevils (*Setophilus granarius*)
Marking pen
1 Screening pan

LEARNING ACTIVITIES/PROCEDURE(S):

1. Form teams (3) students/team to be assigned by your teacher.
2. Obtain supplies from your teacher { (18) 2 liter bottles and grain samples of corn, barley, wheat, oats, and soybeans or whatever samples your teacher will supply. }
3. Check your grain samples for any evidence of weevils. (Remove all weevils if present.)
4. Fill (5) 2-liter bottles with each sample of grain-place 500 grams of grain in each bottle. Label each bottle with the name of grain and date and write "room" temperature on all the bottles. Place 5 weevils in each bottle. Punch 3-4 holes in the cap. Place in an area designated by the teacher.
5. Fill (5) 2-liter bottles with each sample of grain. Place 500 grams of grain in each bottle, and label each bottle with the name of the grain and the date. Also, write "cold storage" on all bottles. Place 5 weevils in each bottle. Punch 3-4 holes in the cap. Place in the refrigerator.
6. Obtain various moisture level samples from teacher, (500 grams/moisture level), 8%, 12%, 16%, and 20% corn and soybeans. (Teacher needs to pre-soak seeds to reach various levels.)
7. Place 5 weevils in each bottle, also write the date and moisture level on each bottle.
8. Allow four-five weeks for samples to develop weevils. At the close of 4 weeks, use screens to determine the number of weevils present. Count each, weigh the grain sample, and record in this plan.
9. Record weekly observations in the next section.

STUDENT OBSERVATIONS/EVIDENCE ANALYSIS

(Data analysis, findings, questions)

1. Record your date and make observations for each sample.

Corn:

| | 8% | | 12% | | 16% | | 20% | |
|----------------|---------|-------|---------|-------|---------|-------|---------|-------|
| | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| # of Weevils | | | | | | | | |
| # of Larva | | | | | | | | |
| Grams of Grain | | | | | | | | |

Soybeans:

| | 8% | | 12% | | 16% | | 20% | |
|----------------|---------|-------|---------|-------|---------|-------|---------|-------|
| | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| # of Weevils | | | | | | | | |
| # of Larva | | | | | | | | |
| Grams of Grain | | | | | | | | |

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

2. Record your observations. What did you observe each week?

Room temperature samples:

Week #1

Week #2

Week #3

Week #4

Cold temperature samples:

Week #1:

Week #2:

Week #3:

Week #4:

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

Moisture samples... corn

Week #1:

Week #2:

Week #3:

Week #4:

Moisture samples... soybeans

Week #1:

Week #2:

Week #3:

Week #4:

STUDENT SUMMARY/CONCLUSION/RECOMMENDATIONS/REFLECTION:

1. Was your prediction correct regarding the grain most desirable for grain weevils? If yes, why? If no, why not?
2. Was your prediction correct regarding the most desirable moisture level for corn? If yes, why? If no, why not?
3. What type of damage did you see occurring in the grain?
4. What conclusions do you draw from this experiment? What recommendation would you suggest for those who store grain?

STUDENT EXERCISES/EXPERIMENTS/ACTIVITIES**NAME:** _____**TITLE:** Biological Affect of Diseases on Plant Health**FOCUS QUESTION:** What is a disease and how does it affect plant health?**OBJECTIVES:** You will...

1. Classify common diseases.
2. Define vectors in disease transmission.
3. Identify and diagnose plant diseases.

STUDENT PREDICTION:

How do diseases affect plant health?

INTRODUCTION:

Disease damages the biological functions of plants. Disease can affect most plants in one form or another.

SCIENCE CONCEPT(S):

Host

Life cycles

Morphology

Infectuous agent

Pathogen

Causal organism

Alternate Host

Pathology

MATERIALS NEEDED:

NOTE: Determine what diseases are abundant in your area and how they affect plants that are grown in your area under these topics.

1. Fruits
2. Vegetables
3. Ornamental Trees
4. Crops
5. Forest trees
6. Ornamental horticulture
7. Stored products

LEARNING ACTIVITIES/PROCEDURE(S):**Activity #1 Disease identification:**

A diseased plant is one which has become altered in its morphology, anatomy or physiology to a degree that the effects are obvious.

1. Identify and define the following: infectious agent, pathogen, physiological disorder, and parasite.
2. Identify types of losses
Chlorosis - loss of chlorophyll
Necrosis - death of plant tissue.
3. Identify two major categories of diseases.
Infectious - Caused by same living organism which invades the host plant.
Noninfectious - results of conditions of circumstances which reduces growth.
4. Identify four types of disease:
Fungi-greatest number and diversity of crop losses.
Bacteria-smallest living entities
Viruses-submicroscopic pathogenetic particle
Nematode-eel like worms that attach to roots, stems, and leaves.
5. Discuss the disease cycle:
Innoculation
Incubation
Infection

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

1. What are some ways that a pathogen can affect the plants metabolism?
2. Why do fungi carry the greatest number of disease?
3. What are some ways that diseases can be spread from plant to plant?

STUDENT SUMMARY/CONCLUSION/RECOMMENDATIONS/REFLECTION:

Were your predictions correct? Why or why not?

STUDENT EXERCISES/EXPERIMENTS/ACTIVITIES**NAME:** _____**TITLE:** Insect Morphology and Identification.**FOCUS QUESTION:** What are the features of various insects?**OBJECTIVES:** You will...

1. Identify insect population and diversity.
2. Describe morphological characteristics of insects.
3. Identify various insects and host species.

STUDENT PREDICTION:

Of all the species of small invertebrate creatures, what percentage are actually classified as insects?

- _____ a. 80.4 %
 _____ b. 7.3 %
 _____ c. 4.6 %
 _____ d. 4.3 %
 _____ e. 3.4 %

INTRODUCTION:

When studying insects, it is important to understand how they develop and their diversity. Insects appear to be everywhere. In this exercise, you will study the insect and the identification of insects that commonly affect various agricultural crops and crop products.

SCIENCE CONCEPT(S):

Morphology
 Entomology
 Host
 Life cycles

MATERIALS NEEDED:

NOTE: Use insects that are abundant in your area and affect plants that are grown in your area under these topics:

- | | |
|------------------------------|----------------------------|
| 1. Fruits | 4. Crops |
| 2. Vegetables | 5. Forest trees |
| 3. Ornamental trees & shrubs | 6. Ornamental horticulture |
| | 7. Stored products |

Containers for each student

LEARNING ACTIVITIES/PROCEDURE(S):**Activity #1 Insect Identification**

1. Obtain three insects from your teacher.
2. Identify the various stages of development in insects over several weeks. Place your insects in a jar and rear insects in a controlled environment from egg to adult.
3. Study and note the following:
 - a) No-metamorphosis Ex: Silver Fish, grasshopper
egg - juveniles - adult
 - b) Gradual metamorphosis Ex: Stink Bug
egg - nymph - adult
 - c) Incomplete metamorphosis Ex: May Fly, aphids
egg - - adult
 - d) Complete metamorphosis Ex: Housefly, cutworm
egg - larvae - pupa - adult

Activity #2 Insect Morphology

1. Obtain various insect species from your teacher.
2. Identify three main body parts and draw them on this worksheet.
 - a) Head
 - b) Thorax
 - c) Abdomen
3. Look at the sample insects given and draw the different mouth parts.
4. Using a list of the common insects in your area that affect:
 - a) Crop production
 - b) Forest production
 - c) Fruit production
 - d) Common nursery and landscape trees, shrubs and flowers.
 - e) Household

STUDENT OBSERVATIONS/EVIDENCE ANALYSIS

(Data analysis, findings, questions)

1. Record differences in insects that you have examined, noting body parts, type of host most utilized, and life cycles.

Activity #1

Given the insects you have been provided, place your three insects in a container and describe the changes occurring each week.

| | Insect _____ | Insect _____ | Insect _____ |
|---------|--------------|--------------|--------------|
| Week #1 | | | |
| Week #2 | | | |
| Week #3 | | | |
| Week #4 | | | |
| Week #5 | | | |
| Week #6 | | | |

What differences have you observed in the three species of insects?

Activity #2

Complete the following...

1. Draw your insect, label each part.

2. Look at your insects, draw the various mouth parts.

3. What insects affect the following:

| | | | |
|-----------------|-------------|--------|---------------|
| Crop production | Trees | Fruit | Landscape |
| Corn: | Coniferous: | Apple: | Yew: |
| | Pine | | Juniper: |
| | Spruce | | Lilac: |
| | Fir | | Honey Suckle: |
| Soybeans: | Deciduous: | | Bluegrass: |
| Oats: | Ash | | Iris: |
| Sugar beets: | Elm | | Tulip: |
| Other _____: | Oak | | |

STUDENT SUMMARY/CONCLUSION/RECOMMENDATIONS/REFLECTION:

1. Was your prediction correct? Why or why not?
2. What insect poses the largest concern in your area and why?
3. What are three ways of controlling insects?
4. What can you do if an insect develops resistance to a control measure?
5. What can you recommend to some one in agriculture on how to identify and control insects?