

**COURSE TITLE:** Plant Science

**UNIT#: 1 UNIT TITLE:** Introduction to Plant Science

**LESSON:** What is the Global Importance of Plants?

**LEARNING OBJECTIVES:**

**Student will...**

Identify the important species of plants to human kind; for food, fiber, medicinal, & industry.

Describe the economic and ecological significance of agricultural plants to the world.

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**SCIENCE CONCEPTS:**

Distribution

Adaptation

**AG SCIENCE PRACTICES:**

Agricultural Regions

Growing Season Requirements

**References, Learning resources, Materials, & Equipment**

Foods of Plant Origin: Salunkhe & Deshpande

Plants in Agriculture: J.C. Forbes and R.D. Watson

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

**Activity:** Scenario

**Leading Questions:**

Imagine that there are no longer any plants on earth. How would this affect your life?

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

**PROBLEM SOLUTION:**

**Layout of the Plan...**

*COMPLETE ACTIVITY 1.1.A*

Key Question #1 How are plants important to humans?

- a. Either directly or indirectly, plants provide all of our food.
  - Directly through wheat, rice, corn, etc...
  - Indirectly by nourishing the animals whose meat, milk, and eggs we consume.
- b. Plants also provide fibers such as cotton and flax.
- c. Plants provide wood for construction and other furnishing uses.
- d. Fuels: coal and oil are the remains of plants from many years ago.
- e. Ethanol and Methanol are made from plant products.
- f. Plants provide paper, rubber, scents, oils, dyes, and drugs.
- g. Plants have an extremely vital environmental importance:
  - forests and grasslands provide habitat for wildlife
  - beauty in the landscape
  - perform photosynthesis: provide oxygen to breath

**Key Question #2** Why are plants so important in the grand scheme of the world's development and survival?

- a. The present population of 5 billion and it's projected growth create enormous demands for food production.
- b. To keep up with current population growth, modern ag technology must double crop productivity in the next 35-40 years.
- c. On the global level, about 88% of the caloric requirements and 90% of the protein ultimately comes from plant sources.
- d. Plants perform photosynthesis

**COMPLETE ACTIVITY 1.1.B**

**Key Question #3** What are the world food production statistics that reflect crops grown in our area?

- a. 42.3% of the total world food production comes from the following cereal crops:
  - wheat
  - rice
  - corn
  - barley
  - other
- b. The second largest food production group are the root crops at 13.8%.
  - potatoes
  - other
- c. Milk accounts for 12.7% of the total world food production.
- d. Vegetables and melons account for 10.3% of the total world food production.
- e. Under the best circumstances, global crop losses estimated to be over million metric tons. (\$140 billion U.S. dollars)
  - The following account for 70% of total losses:
    - insects, disease, weeds
    - Other
      - storage, handling

**Key Question #4** Why are some people concerned with the treatment of animals but not plants?

List some of the features of plants:

- |                             |     |
|-----------------------------|-----|
| -living                     | yes |
| -respond to the environment | yes |
| -provide esthetic value     | yes |
| -provide monetary value     | yes |
| -have feelings              | no  |
| -respond to manipulation    | yes |
| -gene changes               | yes |
| -chemical changes           | yes |
| -life cycles are variable   | yes |

If all these actions occur on plants, few people seem concerned. Why do they become very upset if this is done to animals?

**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:** A World Without Plants**FOCUS QUESTION:**

What is the importance of plants to humans: locally, nationally, and globally?

**OBJECTIVES:**

You Will:

- Identify the important species of plants to human kind.
- Explain the uses of important species around the world.
- Explain the significance of the important agricultural plants to the world.

**STUDENT PREDICTION:**

You wake up tomorrow morning and all of the plants have been removed from earth by an alien life form. What would your life be like after tomorrow? How would this affect your daily activities and lifestyle?

**INTRODUCTION:**

Our daily lives are very dependent upon the resources available to us. One of these resources are plant products.

**SCIENCE CONCEPT(S):**

- Distribution of plants
- Adaptation (zones & growth)
- Dependence
- Reliability
- Conducting research
- Identifying research problems

**MATERIALS NEEDED:**

- MN Ag Statistics Handbook
- Textbook(s) for reference

**LEARNING ACTIVITIES/PROCEDURE(S):**

1. Form groups of three students.
2. Predict ten effects of no plants left in the world.
3. Prioritize the effects listed in #2 on a 1-2-3...10 basis.
4. Compare and analyze the lists created by the smaller groups. What are the differences and similarities between groups?

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

What do you predict would be ten effects of no plants on earth?

**STUDENT SUMMARY/CONCLUSION/RECOMMENDATIONS/REFLECTION:**

What conclusions have you reached as a result of this activity?

**STUDENT EXERCISES/EXPERIMENTS/ACTIVITIES**

NAME: \_\_\_\_\_

**TITLE:** Worldly Differences**FOCUS QUESTION:**

What affect does plant life have on human life in different parts of the world? Why?

**OBJECTIVES:**

You will be able to:

Compare your uses of plants with the uses of a person from another part of the world.

**STUDENT PREDICTION:**

How important are plants and plant products to your everyday life? How does this differ from someone in another part of the world?

**INTRODUCTION:**

Our lives are greatly impacted by the use of plants and plant products, however plants contribute very differently to people in other parts of the world.

**SCIENCE CONCEPT(S):**Adaptation  
Distribution  
Comparison  
Selection**MATERIALS NEEDED:**

Reference material about different countries such as books, pamphlets, Internet, videos.

**LEARNING ACTIVITIES/PROCEDURE(S):**

1. Make a list of every plant or plant product that you use in a typical day.
2. Make a list of every plant use or plant product used during a typical day of a person in another part of the world.
3. Compare, analyze, and explain why the lists are not the same.

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

What differences did you find between your uses of plants and plant products compared to that of a person in another part of the world?

U.S. Uses

Another Part of the World (list the part of the world chosen)

**STUDENT SUMMARY/CONCLUSION/RECOMMENDATIONS/REFLECTION:**

1. What factors influence people's dependence on plants?

2. Could people compensate for the absence of plants?

3. How could or could not this be accomplished?

**COURSE TITLE:** Plant Science

**UNIT#: 1 UNIT TITLE:** Introduction to Plant Science

**LESSON:** How important are plants in relation to the other four kingdoms?

**LEARNING OBJECTIVES:**

**Student will...**

Describe the importance of the plant kingdom.

Compare the plant kingdom to the other four kingdoms.

**SCIENCE CONCEPTS:**

Biology

Botany

Systems

**AG SCIENCE PRACTICES:**

Eating plants

Uses of plants

**References, Learning resources, Materials, & Equipment**

Biology-Mader Brown Publishers

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

**Activity:** Have examples of each of the five kingdoms.

**Leading Questions:**

What are the five kingdoms of living things on earth?

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

**PROBLEM SOLUTION:**

**Layout of the Plan...**

**Key Question #1** What are the five kingdoms of living things?

<b>Name of Kingdom</b>	<b>Organization</b>	<b>Type of Nutrition</b>	<b>Representative Organisms</b>
Monera	Small, simple single cell (sometimes chains or mats)	Absorb food	Bacteria including cyanobacteria
Protista	Large, complex single cell (sometimes chains or colonies)	All types	Protozoa's, algae of various types
Fungi	Multicellular filamentous form with specialized complex forms	Absorb food	Molds and mushrooms
Plantae	Multicellular form with specialized complex cells	Photosynthesize food	Mosses, ferns, woody and nonwoody plants
Animalia	Multicellular form with specialized complex cells	Ingest food	Sponges, worms, insects, fish, amphibians, reptiles, birds, and mammals

**Key Question #2** What are examples of each of the five kingdoms?

**Teacher note:** Students will be asked to develop a list of examples for each kingdom.

**Key Question #3** How are all five of these kingdoms dependent upon each other for existence?

True plants differ from all other organisms (except a few bacteria) in that they build up the materials of which they are constructed, from the simplest of raw materials: water and carbon dioxide gas. Other organisms require an external source of carbohydrates or organic materials that can be readily metabolized to carbohydrates. Animals obtain these materials from their food.

**Monera:**

- a. Bacteria can be used by humans both to dispose of substances and to produce substances.
- b. Bacteria are used to fix-nitrogen in legumes as well as breaking down plant parts into humus.
- c. Bacteria are also used to help silage ferment properly.
- d. Bacteria are also used with fermented foods: wine, sausage, sauerkraut

**Protista:**

- a. Some ingest their food like animals.
- b. Some are photosynthetic like plants.
- c. Some store reserve as starch.
- d. They are dependent upon bacteria to pursue life cycle.

**Fungi:**

- a. Vital for pines to uptake nutrients.
- b. May be used for food. (mushrooms)
- c. They are dependent upon bacteria and protista to pursue life cycle.

**Animalia:**

- a. These use plants for food.
- b. Bacteria are essential in the life processes of animalia.
- c. Protista are essential in the life processes of animalia.
- d. Fungi are essential in the life processes of animalia.

## **PROBLEM CONCLUSION AND/OR SUMMARY:**

1. Review the major factors as to how plants and the other 4 kingdoms are dependent upon one another.
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 1.3

**COURSE TITLE:** Plant Science

**UNIT#: 3 UNIT TITLE:** Introduction to Plant Science

**LESSON:** What are the features of the latest technological advances in plant science?

### **LEARNING OBJECTIVES:**

**Student will...**

Distinguish between varieties of today and yesterday.

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Read up on a new technological advance in plant science.

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### **SCIENCE CONCEPTS:**

Comparison

Observation

Selection

### **AG SCIENCE PRACTICES:**

Analyzing research problems

Reporting research results

### **References, Learning resources, Materials, & Equipment**

Current Periodicals

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Research Journals

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

**Activity:** A visual aid comparing a variety of old vs. an improved one.

**Leading Questions:**

How have technological advances in plant science affected what consumers pay for food?

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

**Teacher's note:** This lesson is intended to be based on current events. The instructor is expected to expose the students to and draw discussion about some of the latest technologies that deal with the plant science area.

### **PROBLEM SOLUTION:**

**Layout of the Plan...**

Some of the possible topics may be but are not limited to:

#### 1. Biotechnology

-insect/disease resistance varieties

-selective herbicides/immune varieties

-genetically engineered foods (flavor savor tomatoes)

-are varieties becoming too similar

2. New up-to-date plant food processing techniques
3. Food safety technology
4. Plant food packaging technology
  - consumer purchasing behavior
5. Production of bio-fuels
  - ethanol
  - alfagas
6. Prescription farming
  - global mapping
  - pest diagnosis
7. Plant nutrition and health
  - soil health
  - dietary risk factors
  - alternative methods of controlling pests

**Student Activity:**

Students will write a half page summary of an article based on some form of one of the previously mentioned new technologies. These articles may come from but are not limited to the following resources:

- |                         |           |
|-------------------------|-----------|
| -DTN                    | -Internet |
| -Agri News              | -Library  |
| -Agricultural Magazines | -Other    |

**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)**

- |                  |                    |                  |
|------------------|--------------------|------------------|
| <b>Cognitive</b> | <b>Psychomotor</b> | <b>Affective</b> |
| 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     |                    |                  |