Lesson C3–2

Understanding Plant Life Cycles

Unit C. Plant and Soil Science

Problem Area 3. Seed Germination, Growth, and Development

Lesson 2. Understanding Plant Life Cycles

New Mexico Content Standard:

Pathway Strand: Plant Systems

Standard: II: Address taxonomic or other classifications to explain basic plant anatomy and physiology.

Benchmark: II-B. Classify plants based on physiology for taxonomic or other classification.

Performance Standard: 2. Classify plants as annuals, biennials or perennials.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Define plant life cycle.
2. Discuss the annual life cycle.
3. Explain the biennial life cycle.
4. Recognize the perennial life cycle.
List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:


Other Resources. The following resources will be useful to students and teachers:


List of Equipment, Tools, Supplies, and Facilities

- Writing surface
- Overhead projector
- Transparencies from attached masters
- Copies of student lab sheet

Terms. The following terms are presented in this lesson (shown in bold italics):

- Annuals
- Biennial
- Deciduous
- Evergreen
- Herbaceous perennials
- Life cycle
- Perennial
- Summer annuals
- Winter annuals
- Woody perennials

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask the students in the class about the average life span of people. Continue by asking at what age most people have children. Explain that when people have children they are completing a life cycle. Redirect the discussion to plants. Ask them if plants have life cycles. Encourage the students to present examples of how long plants are expected to live and reproduce.
Objective 1: Define plant life cycle.

Anticipated Problem: How is a plant life cycle defined?

I. Plants can be grouped or classified on the basis of their life cycles.
   A. A life cycle is defined as the length of time from when a seed germinates until the resulting plant produces new viable seed. The plants that surround us fall into three main life cycles: annual, biennial, and perennial.

Begin the lesson with an interest approach. Use material from this lesson to build a PowerPoint presentation or download a PowerPoint presentation from the web to be used as a guide for classroom discussion. Show the presentation and require students to take notes.

Objective 2: Discuss the annual life cycle.

Anticipated Problem: What is an annual life cycle?

II. Plants that complete their life cycle within one growing season are considered to be annuals.
   A. A typical annual plant might require about 120 days after seed germination to produce seed. The germination process takes roughly 5 days. When the seedlings emerge, the plant enters a vegetative phase. The vegetative phase, which involves leaf growth and food production through photosynthesis, might last 45 days. The plant shifts to a stage in which flower bud development is initiated. Flower bud initiation lasts about 21 days. Flowers develop and emerge in about 14 days. Pollination and fertilization take place over about 3 days. In the final 30 day phase, seeds and fruits mature.
   B. One type of annual plant is the summer annual. Summer annuals, such as corn, tomatoes, and soybeans, germinate in the spring. They mature, produce seed, and die during the summer. Summer annuals are usually sensitive to cold temperatures.
   C. Another type of annual is known as the winter annual. Winter annuals germinate in the fall, form a compact rosette of leaves, sit dormant over the winter, and resume growth in the spring. In the spring they flower and produce seed. Some winter annuals include winter wheat, oats, and rye grass.

Lead a lecture-discussion on annual life cycles. Call upon students to participate in the discussion. Use TM: C3–2A—Annual Life Cycle, and TM: C3–2B—The Life Cycle of a Typical Annual, to highlight stages of an annual plant life cycle. Relate the discussion to real life scenarios and annual crops important to the agriculture industry. Ask questions to assess student understanding of the concepts and to determine if re-teaching is necessary.
Objective 3: Explain the biennial life cycle.

Anticipated Problem: What is a biennial life cycle?

III. Biennial plants are plants that require two years to complete their life cycle.
   A. Typically, biennial plant seeds are sown in the spring. During the first growing season they grow vegetatively. They overwinter and in the second spring resume growth and produce flowers and seed. Some examples of biennial plants are cabbage, carrots, beets, and foxglove.

Continue discussion of life cycles using a PowerPoint presentation. Use TM: C3–2C—Biennial Life Cycle, to illustrate the concepts presented. Draw upon situations in the industry where the life cycle of biennial plants is important.

Objective 4: Recognize the perennial life cycle.

Anticipated Problem: What is a perennial life cycle?

IV. Perennial plants are a group of plants that have life cycles that go beyond 2 years.
   A. Herbaceous perennials have shoots that die to the ground each fall. The root system survives the winter, and provides energy for the growth of new shoots in the spring. Daylilies, asparagus, strawberries, and rhubarb are herbaceous perennial plants.
   B. Woody perennials have a top that persists through winter. In the spring shoot growth resumes from latent or adventitious buds. Trees and shrubs are woody perennials. Trees and shrubs that drop all of their leaves in the fall are said to be deciduous. Plants whose leaves persist throughout the year are termed evergreen. Evergreen plants shed some leaves every year. A typical evergreen leaf lasts 1–3 years before dropping.

Prepare the students by having them read related sections of text materials identified in the resources list. Require students to take notes on the major points presented in the chapter. Follow the reading session with a discussion on the process of photosynthesis. Use TM: C3–2D—Perennial Life Cycle. Have the students expand their notes based on the discussion. The discussion can also serve as a way to monitor students’ mastery of the material.

Review/Summary. Summarize the content of the lesson as part of the review process. Be sure the expected outcomes are based on the student learning objectives. Have students answer questions orally related to the content associated with each objective. Student responses can be used in determining which objectives require greater review or whether further instruction is necessary. Questions at the end of each chapter in the recommended textbooks may also be used in the review/summary.
Application. Use LS: C3–2A—Plant Life Cycles to apply the concepts presented in the lesson’s learning objectives.

Evaluation. Focus the evaluation of student achievement on mastery of the objectives stated in the lesson. Measure student performance on classroom participation, laboratory assignments, and written tests or quizzes.

Answers to Sample Test:

Part One: Matching
1 = i, 2 = c, 3 = f, 4 = h, 5 = a, 6 = b, 7 = g, 8 = e, 9 = j, 10 = d

Part Two: Completion
1. woody perennials
2. cabbage, carrots, beets and foxglove
3. 120
4. Daylilies, asparagus, strawberries, and rhubarb
5. 1–3 years
6. vegetatively
7. life cycles
8. annual, biennial, and perennial
9. winter wheat, oats, and rye grass
10. cold temperatures

Part Three: Short Answer
1. A typical annual plant might require about 120 days after seed germination to produce seed. The germination process takes roughly 5 days. When the seedlings emerge, the plant enters a vegetative phase. The vegetative phase, which involves leaf growth and food production through photosynthesis, might last 45 days. The plant shifts to a stage in which flower bud development is initiated. Flower bud initiation lasts about 21 days. Flowers develop and emerge in about 14 days. Pollination and fertilization take place over about 3 days. In the final 30 day phase seeds and fruits mature.

2. Typically, biennial plant seeds are sown in the spring. During the first growing season they grow vegetatively. They overwinter and in the second spring resume growth and produce flowers and seed.

3. Herbaceous perennials have shoots that die to the ground each fall. The root system survives the winter, and provides energy for the growth of new shoots in the spring. Woody perennials have a top that persists through winter. In the spring shoot growth resumes from latent or adventitious buds.
Lesson C3–2: Understanding Plant Life Cycles

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. Annual            f. Life cycle
b. Biennial           g. Perennial
c. Deciduous          h. Summer annual
d. Evergreen          i. Winter annual
e. Herbaceous perennial j. Woody perennial

_______ 1. Seeds germinate in the fall, form a compact rosette of leaves, sit dormant over the winter, and resume growth in the spring.
_______ 2. Trees and shrubs that drop all of their leaves in the fall.
_______ 3. The length of time from when a seed germinates until the resulting plant produces new viable seed.
_______ 4. Seeds germinate in the spring, mature, produce seed, and die during the summer.
_______ 5. Plants that complete their life cycle within one growing season.
_______ 6. Plants that require two years to complete their life cycle.
_______ 7. Plants that have life cycles that go beyond 2 years.
_______ 8. Perennials whose shoots die to the ground each fall.
_______ 9. Perennials that have a top that persists through winter.
_______ 10. Plants whose leaves persist throughout the year.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. Trees and shrubs are _______________ ________________.
2. Some examples of biennial plants are __________, ________, ________, and __________.
3. A typical annual plant might require about _____ days after seed germination to produce seed.
4. __________, __________, __________, and ________ are herbaceous perennial plants.
5. A typical evergreen leaf lasts ________ before dropping.
6. During the first growing season biennials grow ________________.
7. Plants can be grouped or classified on the basis of their ___________ ____________.
8. The plants that surround us fall into three main life cycles: ________, ________, and ________.
9. Some winter annuals include ________________, ____________, and ______________.
10. Summer annuals are usually sensitive to ________ ________________

**Part Three: Short Answer**

**Instructions.** Provide information to answer the following questions.

1. Describe the growth and development process of a typical annual.

2. Describe the growth and development process of a typical biennial.

3. Explain how herbaceous perennials and woody perennials differ.
ANNUAL LIFE CYCLE

Germination → Growth → Flowering → Death
TYPICAL LIFE CYCLE OF AN ANNUAL

Live cycle—120 days from germination to mature seed

- Fertilization (3 days)
- Flower opening (14 days)
- Pollination
- Reproductive phase of growth (38 days)
- Leaf growth
- Vegetative phase of growth (45 days)
- Flower initiation

- Seed planted
- Germination (2 days)
- Emergence (5 days)
- Fruit and seed maturity (30 days)

- Flower initiation
- Flower opening
- Fertilization
- Pollination
BIENNIAL LIFE CYCLE

Germination → Growth → Flowering → Dormancy

One or more flowering cycles
PERENNIAL LIFE CYCLE

Germination → Growth → Dormancy → Growth → Flowering → Death
(Season 1)                             (Season 2)
Lab Sheet

Plant Life Cycles

Purpose:

Students will classify plants based on their life cycles.

Materials:

Pencil or pen
Reference materials

Procedure:

List plants that are included in the life cycle groupings.

Summer annuals

a.
b.c.d.e.f.g.h.i.j.k.

Winter annuals

a.b.c.d.e.f.

Biennials

a.
b.
c.
d.
e.
f.

**Herbaceous perennials**

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.

**Woody perennials**

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.