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:

Lee, Jasper S. and Diana L. Turner. *Introduction to World AgriScience and Technology*. Danville, IL: Interstate Publishers, Inc. 1997

Parker, Rich. *Introduction to Plant Science*. Albany, New York: Delmar. 2000

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

Biondo, Ronald J. and Jasper S. Lee. *Introduction to Plant and Soil Science and Technology*. Danville, IL: Interstate Publishers, Inc. 2003

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.

Summary of Content and Teaching Strategies

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.

Sample Test Name_____

Test

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.

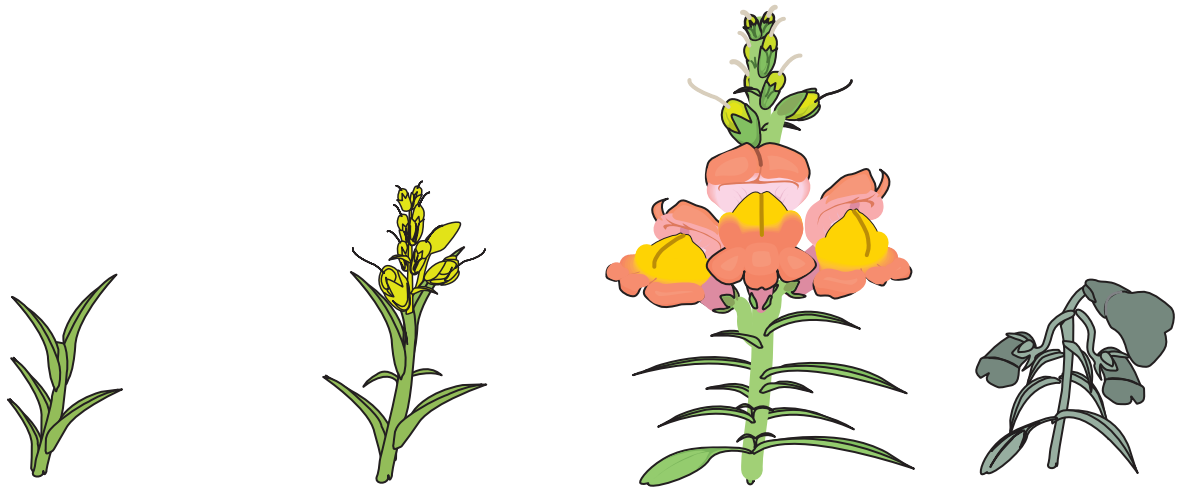
1. Describe the growth and development process of a typical annual.

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

3. Explain how herbaceous perennials and woody perennials differ.

TM: C3–2A

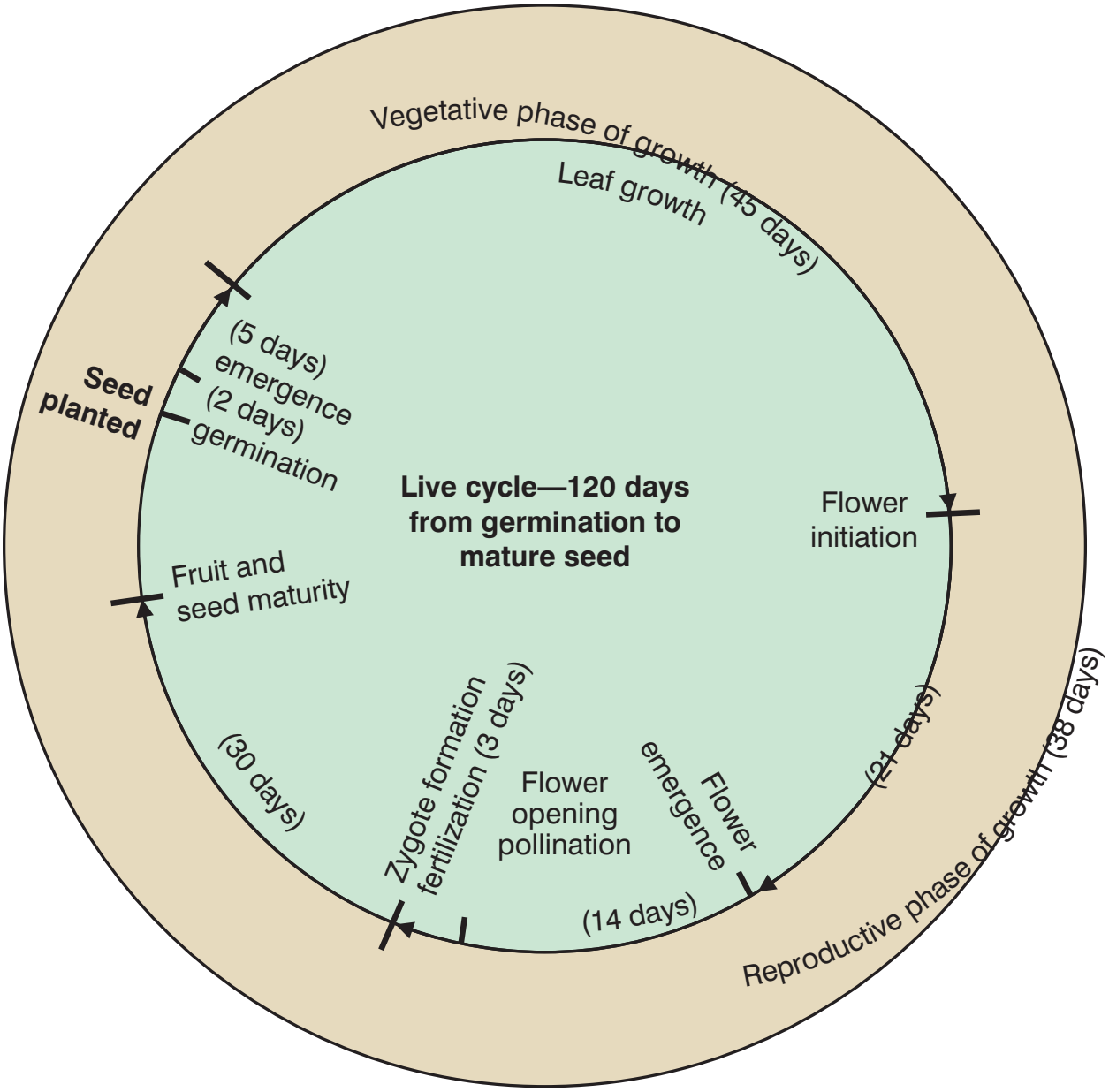
ANNUAL LIFE CYCLE



Germination → Growth → Flowering → Death

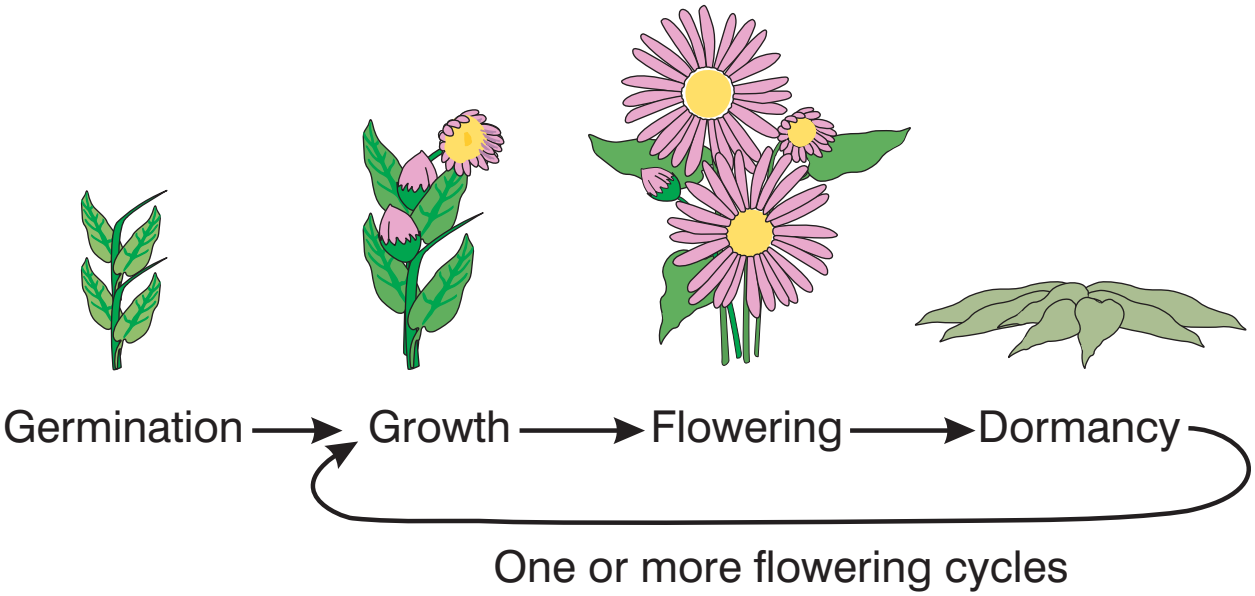
TM: C3–2B

TYPICAL LIFE CYCLE OF AN ANNUAL



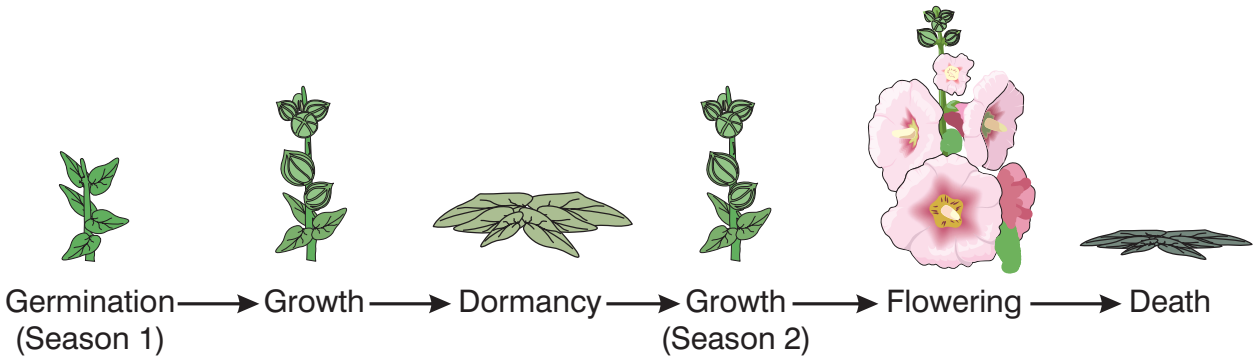
TM: C3–2C

BIENNIAL LIFE CYCLE



TM: C3–2D

PERENNIAL LIFE CYCLE



Name_____

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.