

Unit B: Seed Germination, Growth, and Development

Lesson 2: Understanding Plant Life Cycles

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.

Recommended Teaching Time: 2 hours

Recommended Resources: The following resources may be useful in teaching this lesson:

- A PowerPoint has been developed for use with this lesson plan
- http://www.somers.k12.ny.us/sis/MAIN/sis/research/gr4links/plants_gr4/plants.html

List of Equipment, Tools, Supplies, and Facilities:

Writing surface
Projector
PowerPoint Slides
Transparency Masters
Copies of student lab sheets
Plant specimens for lab

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide 2):

- 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.

**** Use this activity to lead discussion over the definition of life cycle**

Summary of Content and Teaching Strategies

Objective 1: Define plant life cycle.

****Based on the interest approach have the students come up with a definition of a lifecycle. Find out if they can name the three main life cycles before showing the information for objective 1**

(PowerPoint Slides 3 and 4)

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.

Objective 2: Discuss the annual life cycle.

(PowerPoint Slides 5 and 6)

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. **(PowerPoint Slide 7 illustrates the typical life cycle of an annual plant)**

(PowerPoint Slide 8)

- B. One type of annual plant is the summer annual. **Summer annuals**, such as maize, cotton, tomatoes, and many other vegetable plants, 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. Wheat and chickpeas are two common winter crops in Afghanistan.

****Lead a lecture-discussion on annual life cycles. Call upon students to participate in the discussion. Use TM: B2-1—Annual Life Cycle, and TM: B2-2—The Life Cycle of a Typical Annual, to highlight stages of an annual plant life cycle. Power Point Slide 9 can also be used. Relate the discussion to real life scenarios and annual crops important to the agriculture industry in Afghanistan and/or the Helmand province. Wheat would be a great example to use.**

Objective 3: Explain the biennial life cycle.

(PowerPoint Slides 10 and 11)

III. **Biennial** plants are plants that require two years to complete their life cycle.

- A. Typically, biennial plant seeds are sown in the spring. In the first year the plant grows leaves, stems, and roots (vegetative structures), then it enters a period of dormancy over the colder months. They overwinter and in the second spring or summer the stem of the biennial plant elongates greatly. The plant then flowers, producing fruits and seeds before it finally dies. Two examples of biennial plants are carrots and beets.

**** Use TM: B2-3—Biennial Life Cycle, to illustrate the concepts presented.**

PowerPoint Slide 12 can be used as well. Have students get into groups of five and make a list of other plants in the area that are considered to be biennial. After five minutes of work, have the groups share their list with the rest of the class.

Objective 4: Recognize the perennial life cycle.

(PowerPoint Slides 13 and 14)

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.

(PowerPoint Slide 15)

- 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.

**** Use TM: B2-4—Perennial Life Cycle. PowerPoint Slide 16 will also work.**

****Have students complete LS: B2-1. Take a look at the Lab Sheet to know how many plants you are going to need. If you can't come up with real plant specimens, take pictures with a camera or use pictures from a book. When the students are finished completing their Lab Sheet, discuss answers as a class.**

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. A few questions from **PowerPoint Slide 17** can be used during the review.

Another possible review activity can be done by using the vocabulary words. You will need to divide the students into groups of two. Using the vocabulary words in this lesson, have the students help their partner learn the vocabulary words by giving them the definition. Then the other person will have to tell you what vocabulary word I'm talking about. For example one person in the group will tell their partner, "Plants whose leaves persist throughout the year are termed. What am I?" The other person will try to guess the word "evergreen." Students will go through all of the words and then switch roles with their partner.

Application: Use LS: B2-1—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 the student's 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. carrots, and beets
3. 120
4. Asparagus, strawberries, artichokes, and onions
5. 1–3 years
6. vegetative structures
7. life cycles
8. annual, biennial, and perennial
9. wheat and chick peas
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 vegetative structures (leaves, stems and roots). 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.

Test

Unit B Lesson 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.

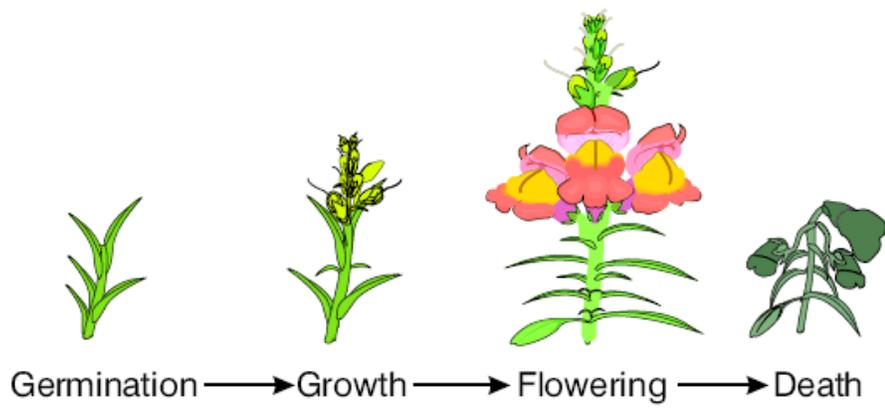
Part Two: Completion

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

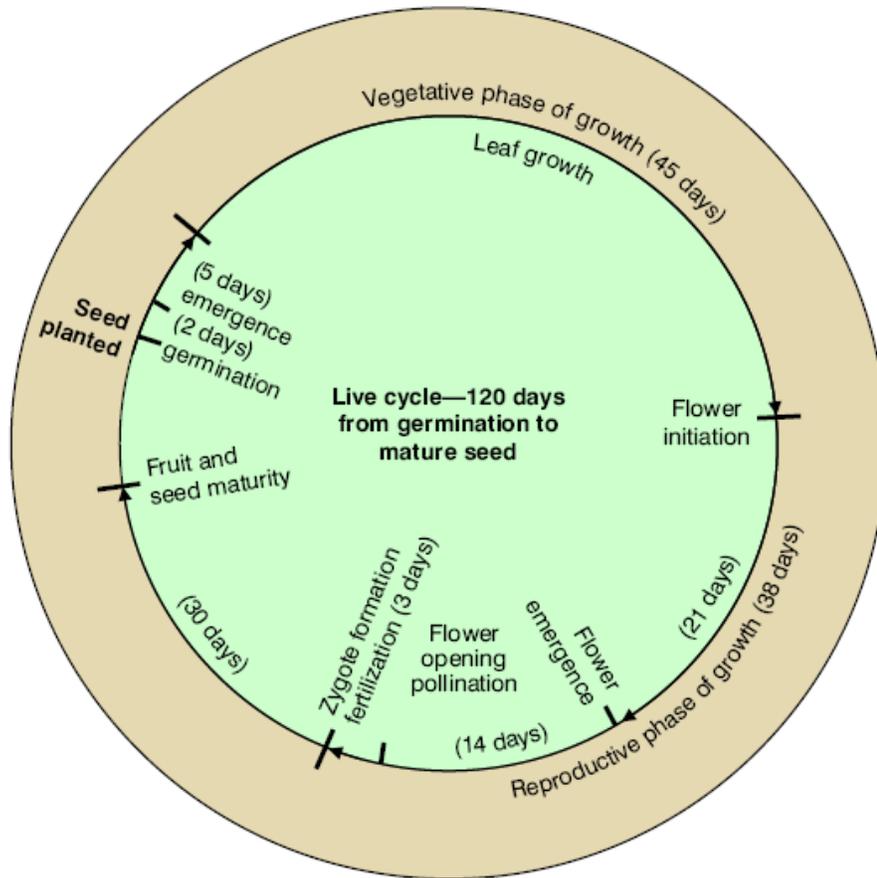
- 1. Trees and shrubs are _____.
- 2. Some examples of biennial plants are _____, and _____.
- 3. A typical annual plant might require about _____ days after seed germination to produce seed.
- 4. _____, _____, _____, and _____ are examples of herbaceous plants.
- 5. A typical evergreen leaf lasts _____ before dropping.
- 6. During the first growing season biennials grow _____.
- 7. Plants can be grouped or classified on the basis of their _____.

TM: B2-1

ANNUAL LIFE CYCLE

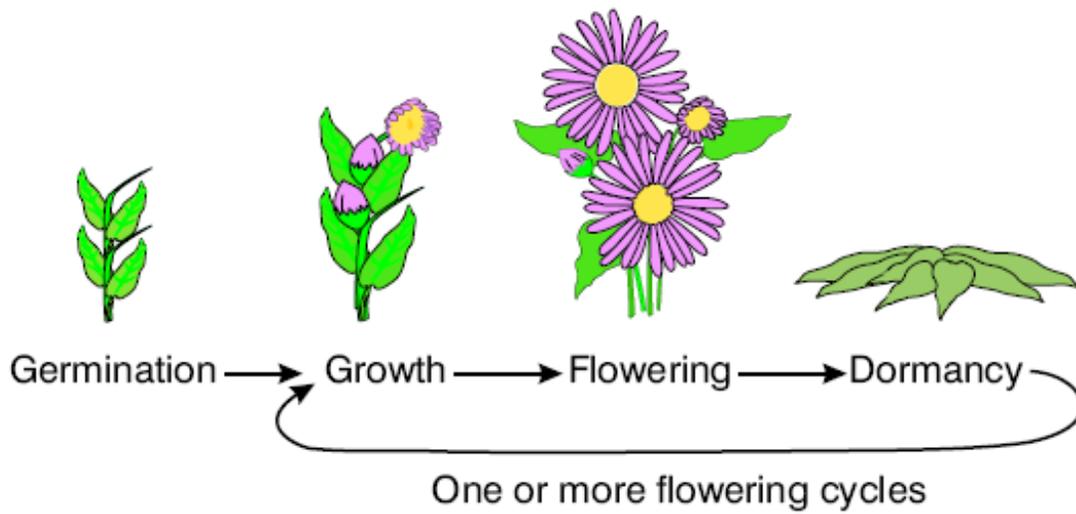


TYPICAL LIFE CYCLE OF AN ANNUAL



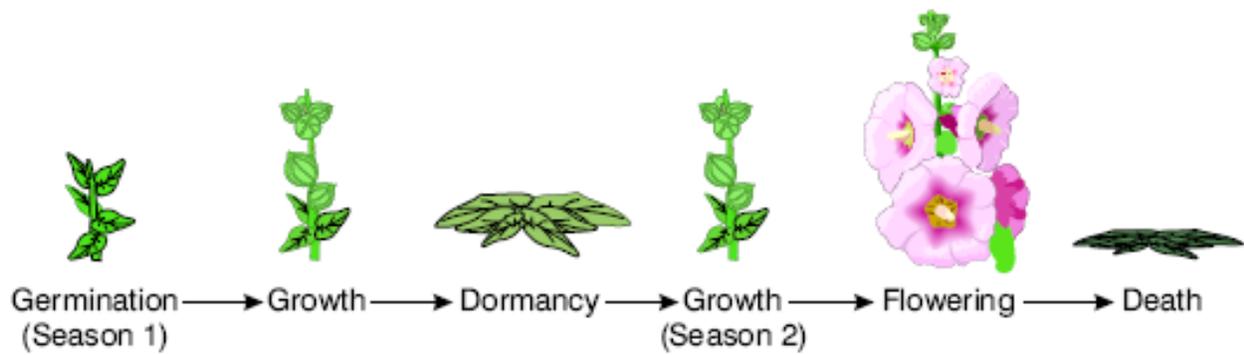
TM: B2-3

BIENNIAL LIFE CYCLE



TM: B2-4

PERENNIAL LIFE CYCLE



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.