



4-H Plant , Soils, and Entomology Curriculum



## Exploring the World of Plants and Soils

Project Book 2

# Stems and Stamens



**Virginia Cooperative Extension**  
Virginia Tech • Virginia State University

Publication 380-021

2014

# Stems and Stamens

## Table of Contents

.....

Note to Project Helper .....	1
What's Inside.....	2
Project Guidelines .....	3
Activity 1 The Stages of a Plant's Life .....	5
Activity 2 A Closer Look at Plants .....	8
Activity 3 Getting to the Root of Roots.....	11
Activity 4 Stems in Action .....	14
Activity 5 Looking at Leaves .....	18
Activity 6 What Does it Take to Make a Seed?.....	21
Activity 7 Surrounded by Seeds .....	24
Activity 8 Germinating Seeds the Easy Way .....	27
Activity 9 Can Shoots Grow Roots? .....	31
Activity 10 Growing Roots in the Air .....	34
Activity 11 Plants from Stems.....	37
Activity 12 More Plants from Unique Plant Parts .....	40
Glossary .....	43

## Acknowledgements

.....

**Lead Author:** Laurie W. DeMarco, Ph.D., Science and Education Consultant, Salem, Va.

**Co-Author:** Kathleen Jamison, Ph.D., 4-H Curriculum and Learning Specialist, Virginia Tech, Blacksburg, Va.

**Review Team:** 4-H Plant, Soils, and Entomology Curriculum Committee: John Blankenship, Leonard Elam, Staci England, Sandra Fisher, Joe Hunnings, Ellen Powell, Ruth Wallace

**Layout and Design:** Tim FisherPoff, Agriculture and Extension Communications, Blacksburg, Va.

**Funding:** Virginia Cooperative Extension

**Source Citations:** The following sources were helpful in developing the Virginia *4-H Exploring the World of Plants and Soil Project*:

Behme, R.L. (1992). *Incredible Plants: Oddities, Curiosities, and Eccentricities*. Sterling Publishing Co., Inc. New York, N.Y.

*Exploring the World of Plants and Soils: 4-H Plant and Soil Science Project Series*. National 4-H Council , Chevy Chase, Md.

Stern, L.R. (2000). *Introductory Plant Biology*. McGraw Hill: Boston, Mass.

**WARNING:** Some Website links referenced in this publication are not managed by Virginia Cooperative Extension, and it does not review, control, or take responsibility for the contents of those sites.

# Stems and Stamens

## Note to the Project Helper

Stems and Stamens is the first Project Book in the Exploring the World of Plants and Soils series. This Project Book looks at the composition of plants, the functions of individual plant parts, plant life cycles, and the many ways plants reproduce themselves. It is written to interest youth ages 12 to 14.

The *Exploring the World of Plants and Soils* Project Books include:

It's More Than Just Dirt

Stems and Stamens

Sprouting Out and Growing Up

## Exploring the World of Plants and Soils Project Goals

The objectives of this series are to give young people the opportunity to:

- Learn basic facts about plants and soils including plant growth factors, plant reproduction, plant characteristics, how people utilize plants, and the function and characteristics of soil.
- Gain knowledge about plants and soils through experimentation and exploration.
- Stimulate an interest in gardening, plants, soils, and the natural world.
- Appreciate human accountability for responsible earth stewardship and environmental decision making.
- Relate to life cycles and other cycles found in nature.

## Project Helper's Role

For youth to gain the most from this learning experience you should:

- Review the Stems and Stamens Project Book.
- Support the youth as he or she sets goals and completes each activity.
- Play a proactive role in selecting activities, assisting in activity completion, and answering questions.
- Help the young person think about what she/he is experiencing and learning through active listening and open-ended questioning.
- Encourage the youth to keep a Project Journal to document activity recordkeeping requirements, answer activity questions, and record personal thoughts and ideas.
- Serve as a resource person to help the young person connect with the community, resource materials, and others knowledgeable about plants and soil.

These experiences can be fun and educational for both you and the young person who takes on this challenge. You don't have to be an authority on plant and soil science to be a leader in this project, but you do need the enthusiasm and desire to help youth learn and grow as they explore the world of plants and soils.

## What's Inside

---

The *Stems and Stamens* project activities offer you many interesting and exciting experiences for learning about plants, plant life cycles, and plant reproduction. You will also learn about different plants parts and how they work together for healthy plant life.

Here is a look at the various sections found in each activity:

**Skills:** The 4-H life and science process skills practiced as you do the activity. You will also have many opportunities to share what you learned with others.

**Educational Standards:** The Virginia Standards of Learning (SOL) for life sciences (LS), mathematics (Math), and language arts (LA) and the National Science Standards (grades 5 to 8) addressed by the activity.

**Achievement Check:** The skill you should learn by finishing this activity. Keep working on the activity until you have mastered each skill.

**Materials:** The supplies and equipment needed for each activity.

**Let's Investigate:** The exploration or experiment you carry out to learn about plants and soil.

The following information is found in each activity:



Considering Plants  
and Soil

**Considering Plants and Soil:** Questions you answer and discuss with your helper that are related to what you have learned about plant parts, plant life cycles, and plant reproduction.



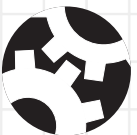
Diggin' In

**Diggin' In:** The information needed to help you complete the activity.



Branching Out

**Branching Out:** Additional activities to help you utilize and understand what you learned in the activity.



Cool Connections

**Cool Connections:** Interesting facts about plants and soil.



Word Power

**Word Power:** New words to learn and use. New words are found in bold print in the activities. Definitions are found in the glossary at the end of this book.

## Project Guidelines

To complete the *Stems and Stamens* project you must:

- Select a 4-H Project Helper
- Complete a minimum of four Required Activities and four Optional Activities in the Stems and Stamens Project Book
- Participate in a minimum of two Leadership Experiences
- Participate in a minimum of one Service Learning activity
- Keep a Project Journal

### 4-H Project Helper

Select an adult project helper to support and assist you with these activities. This person may be a parent, family member, 4-H project leader, teacher, neighbor, or friend. The choice is yours. As you do the activities, discuss the activity process and your conclusions with your helper. Ask your helper to assist you throughout this project. Your helper can assist you as you set your project goals, discuss activity questions with you, and help you locate resources.

Name \_\_\_\_\_ Phone \_\_\_\_\_ Email \_\_\_\_\_

### Project Activities

Carry out at least four Required Activities located under *Let's Investigate*. Ask your helper to date and initial this log as you complete the activities.

Required Activity	Date Completed	Helper's Initials	Required Activity	Date Completed	Helper's Initials
The Life Cycle of a Plant	_____	_____	Surrounded by Seeds	_____	_____
A Closer Look at Plants	_____	_____	Germinating Seeds the Easy Way	_____	_____
Getting to the Root of Roots	_____	_____	Easy Way	_____	_____
Stems in Action	_____	_____	Can Shoots Grow Roots?	_____	_____
Looking at Leaves	_____	_____	Growing Roots in the Air	_____	_____
What Does it Take to Make a Seed?	_____	_____	Plants from Stems	_____	_____
			More Plants from Unique Plant Parts	_____	_____

### Optional Activities

Do at least four Optional Activities located under **Branching Out** and list them here.

	Date Completed	Helper's Initials
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

## Leadership Experiences

Select and participate in at least two of these leadership experiences or devise one of your own. A leadership activity requires the organization of and the participation in an event, presentation, or tour.

Leadership Experience	Date Completed	Helper's Initials
Give a project demonstration	_____	_____
Teach someone something about plants	_____	_____
Give a speech on a plant subject	_____	_____
Give a plant propagation demonstration	_____	_____
Teach someone how to take cuttings	_____	_____
Teach someone something about plant propagation	_____	_____
Organize a tour of a greenhouse business	_____	_____
Attend a gardening demonstration	_____	_____
Exhibit a plant project	_____	_____
Other leadership experiences:		
_____	_____	_____
_____	_____	_____
_____	_____	_____

## Service Learning Experience

Select and participate in at least one service learning experience or devise one of your own. A service learning experience requires that you do something to enrich your community.

	Date Completed	Helper's Initials
Plant something to improve the environment	_____	_____
Share something you have grown with someone	_____	_____
Plant a vegetable garden and share the produce with a food bank, neighbor, or family	_____	_____
Gather flowers to share with an elderly person	_____	_____
Other service learning experiences:		
_____	_____	_____
_____	_____	_____
_____	_____	_____

## Project Journal

Keep a Project Journal to document activity record-keeping requirements, answer activity questions, and record personal thoughts and ideas.

# Activity 1. The Stages of a Plant's Life

Sometimes it is hard to believe that plants are living organisms. We don't see plants move around, hunt for food, or any of the other things we associate with being "alive." However, like all living things, plants need food, water, and air to survive; they produce offspring (usually **seeds**); they respond to environmental changes; they maintain a stable internal condition; and they change in size by growing. In addition, like every other living thing, a plant has a **life cycle**. A life cycle is a series of stages through which a living thing passes before arriving back again at the starting point.

## Let's Investigate

### The Life Cycle of a Plant

Since the different stages of a plant's life cycle usually occur over the course of an entire year or growing season, it is difficult to see all of the life stages at one time. Fortunately for us, as a plant lives through the different stages of its life cycle, it often leaves behind evidence of past stages either attached to its being or scattered close by. Follow these steps to discover a plant's life cycle.

1. Select a small plant growing in your garden or yard.
2. Search out evidence of the plant's growth and reproduction from the current and/or the prior year. This evidence can often be found in the **leaf litter** and soil located around the base of the plant. You may have to dig through the soil to find some of these items. You may also find the different stages still attached to the growing plant.
3. On a sheet of hard cardboard, your poster, draw a large circle.
4. Collect and mount the following parts on the circle in the correct order of a plant's life cycle:
  - Seeds
  - **Germinated** seed
  - **Fruit** or seed pod
  - **Mature** plant
  - Flower
5. Label each part and describe its function in the life cycle of the plant.
6. Present your poster to your group or helper. Explain what you learned about each part of the plant life cycle.

**Activity:** Identify the different stages of a plant's life cycle

**Life Skill:** Interpreting Information – Understands and analyzes information

**Science Process Skill:** Organizing and classifying information

**Achievement Check:** You can describe the different stages of a plant's life cycle

**Virginia SOL:** LS.4; LA 6.2, 7.1

**National Science Standard:** All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.

**Materials:** cardboard, glue, marker pen, garden trowel



## Considering Plants and Soil

### Let's Talk

What plant parts were the easiest to find? Which were the most difficult?

What stages of the plant's life cycle were found all at the same time on the growing plant itself?

### Let's Reflect

Describe the life cycle of a pet dog, cat, rabbit, or fish. How is it similar to a plant's life cycle? How is it different?

Think about a plant going through its life cycle in your garden. What environmental factors might affect the plant's ability to complete its life cycle? What features of the plant allow it to adapt to changing environmental factors?

### Let's Use It

How does knowing about life cycles help you understand your own life now and in the future?

How can you use your understanding of life cycles to make plans for your future?



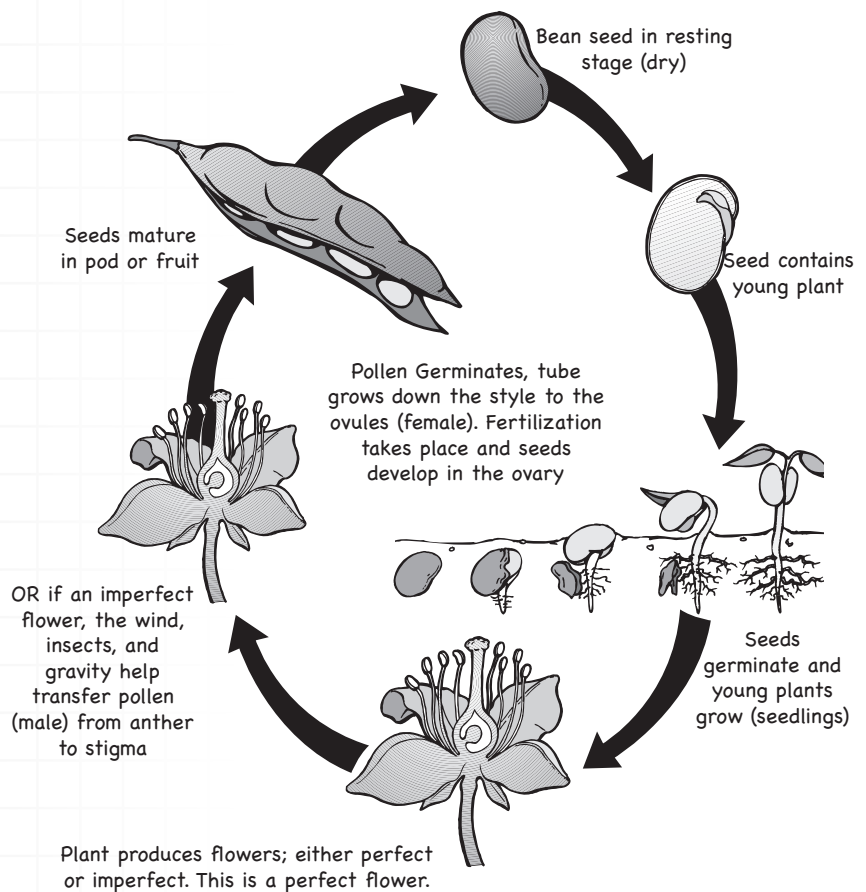
## Diggin' In

### The Cycle of Life

Have you ever been asked the question, "Which came first, the chicken or the egg?" Just as it is difficult to determine the answer to this question for a chicken, it is equally difficult to answer it for a plant. For simplicity's sake, we will say that a plant's life cycle begins with the seed. The seed germinates and produces a young plant which grows and matures into a full-grown plant. At maturity, the plant produces flowers.

**Reproduction** occurs in the flowers, and new seeds are formed. From this point the life cycle starts all over again.

For a plant's life cycle to progress from beginning to end, a sprouting seed develops roots, stems, leaves, buds, and flowers which work together to ensure healthy growth. Healthy plant growth leads to the eventual production of new seed, which guarantees the continuation of the plant-type into the next generation.







## Branching Out

1. Explore the life cycles of a long-lived plant, such as an oak tree, and that of a short-lived plant, such as a marigold. Write a paragraph describing the two life cycles in your journal. Discuss the similarities and differences with your helper.

2. Find out the differences among an annual, a biennial, and a perennial plant. Make a list of examples of each in your journal. Cut out or draw pictures of each type of plant. Discuss your list with your helper.



## Cool Connections

The plant with the longest, normal life span is the yucca. Some yuccas have lived to be 200 to 300 years old! However the oldest known plant is the Bristlecone Pine. The record-holder is located in the Wheeler Peak area of Nevada and has lived for more than 4,900 years!



## Word Power

Flower

Fruit

Germinate

Leaf litter

Life cycle

Mature

Reproduction

Seed