

## Photo Description



This image shows a climbing vine plant with long, green pod-like structures and large leaves growing up a wooden fence. The vines are using the fence as a support structure to grow upward toward the sunlight. The large green pods hanging down appear to be mature fruit or seed pods from this climbing plant.

## Scientific Phenomena

Anchoring Phenomenon: Why do some plants climb up fences instead of growing flat on the ground?

Climbing vines grow upward toward light because plants need sunlight to make their own food through photosynthesis. These vines have special structures (like tendrils or twining stems) that help them wrap around or attach to supports like fences. By growing upward, the vine's leaves can reach more direct sunlight while using less energy to support their own weight. This is a smart survival strategy that allows plants to access resources (light, air) without needing to build thick, woody stems like tree trunks.

## Core Science Concepts

- Plant Growth and Structure: Plants grow in specific directions to find resources. Climbing vines use specialized parts to attach to supports and grow upward toward light.
- Adaptation: Vining plants have adapted over time with features that help them climb (tendrils, twining stems, or sticky pads) to survive in their environment.
- Photosynthesis and Energy: Plants need sunlight to make food and grow. By climbing toward light, these plants position their leaves to capture more energy from the sun.
- Plant Life Cycles: The large pods visible in the photo are part of the plant's reproductive cycle—they contain seeds that can grow into new plants.

### Pedagogical Tip:

When teaching about climbing vines, have students observe the actual attachment points. Ask them to gently trace how the vine connects to the fence without damaging the plant. This tactile observation helps students understand that adaptations are real, physical structures—not just ideas. This concrete experience deepens comprehension better than pictures alone.

### UDL Suggestions:

To support all learners: (1) Representation: Provide labeled diagrams showing different vine attachment methods (tendrils, twining stems, aerial rootlets) so visual learners can see the variety of adaptations. (2) Action & Expression: Allow students to demonstrate climbing vine growth using their own bodies—have them pretend to be a vine growing up the fence, showing how they "grip" and climb. (3) Engagement: Connect to students' own experiences by asking if they've seen vines growing on their homes or in nature near school, making the learning personally relevant.

## Zoom In / Zoom Out

### Zoom In (Cellular/Microscopic Level):

If we could look inside the vine's cells with a microscope, we'd see that the plant cells contain chloroplasts—tiny structures that capture sunlight and convert it into chemical energy (sugar) that the plant uses to grow. The vine's stem cells have special structures that allow them to bend and wrap around objects. The seeds inside the pods contain plant embryos that are waiting for the right conditions (water, warmth, light) to sprout into new plants.

### Zoom Out (Ecosystem/Larger System Level):

This climbing vine is part of a larger ecosystem. The fence provides a physical support, but the vine also provides food and shelter for insects, birds, and other animals. If the vine produces flowers, pollinators like bees visit them. The seeds eventually fall and spread to new locations. Over seasons and years, climbing vines can change the appearance of landscapes and create habitats for many organisms. This single plant contributes to the health and diversity of its entire neighborhood ecosystem.

## Discussion Questions

1. "What do you think would happen to this vine if we removed the fence? Where might it try to grow instead?"  
- (Bloom's: Analyze | DOK: 2)
2. "Why might a climbing vine be a better survival strategy than growing as a low bush close to the ground?"  
- (Bloom's: Evaluate | DOK: 3)
3. "Can you think of other structures around your home or school where plants might climb? What would a plant gain by growing up those structures?"  
- (Bloom's: Apply | DOK: 2)
4. "If this vine produces seeds inside those green pods, how do you think those seeds might travel to other places to grow into new plants?"  
- (Bloom's: Synthesize | DOK: 3)

## Potential Student Misconceptions

- Misconception: "Plants grow toward the fence because they want to climb it."
- Scientific Clarification: Plants don't have desires or wants. Vines grow upward because of a natural response to gravity and light called tropism. Their stems naturally bend and grow toward light (phototropism), and the tendrils naturally wrap around objects they touch. It's automatic, not intentional.
- Misconception: "The plant eats the fence for food."
- Scientific Clarification: Plants don't eat anything! They make their own food using sunlight, water, and air through photosynthesis. The fence is only a support structure—like a ladder that helps the plant reach more sunlight. The plant gets its nutrients from soil through its roots.
- Misconception: "All vines are the same and grow the same way."
- Scientific Clarification: Different vine species have adapted different climbing methods. Some use tendrils (thin, curly structures), some twist their stems around supports, and some use sticky pads or aerial roots. Each adaptation helps that particular vine survive in its environment.

## Extension Activities

1. Observation Journal - "Vine Detective Hunt": Take students on a nature walk around the school grounds or neighborhood to find other climbing plants. Have them sketch or photograph different vines and note how each one climbs (tendrils, twining stems, etc.). Create a classroom poster comparing the different climbing strategies they discovered. This develops observational skills and reinforces that adaptations vary.
2. Hands-On Model Building - "Build a Climbing Structure": Provide students with pipe cleaners (to represent tendrils), yarn (to represent twining stems), and a small wooden frame or lattice structure. Have them use these materials to demonstrate how different vines climb. Students can compete to build the strongest or most creative climbing model. This kinesthetic activity helps concrete learners understand vine adaptations.
3. Seed Exploration & Planting - "From Pod to Plant": If possible, collect seeds from the vine pods (or use bean seeds as a substitute). Have students open the pods, count the seeds, and examine them with magnifying glasses. Then plant seeds in small cups and observe them over several weeks, recording observations about germination and early growth. This connects to plant life cycles and allows students to witness growth firsthand.

## Cross-Curricular Ideas

- Mathematics: Measure the height the vine has climbed up the fence and predict how tall it might grow in one month or one year. Create bar graphs comparing the number of leaves, pods, or flowers on different vines. Calculate the area of fence space covered by the vine.
- English Language Arts: Write a short narrative story from the perspective of the vine as it grows up the fence. Create descriptive poetry using sensory words about climbing plants (rough fence, soft leaves, cool shade). Read and discuss plant-related folktales or legends (Jack and the Beanstalk).
- Social Studies: Investigate how different cultures use climbing vines for food, medicine, or decoration (grapes, hops for beer, vanilla, ivy for privacy). Research how urban gardeners use vines to create green spaces in cities. Learn about terraced gardens in different regions that use vine crops.
- Art: Create mixed-media collages using real leaves, pressed plants, and drawings of climbing vines. Paint or sketch the fence and vines from different seasons (spring growth, summer fullness, fall harvest, winter dormancy). Design a garden plan that includes climbing vines in interesting ways.

## STEM Career Connection

1. Botanist - A botanist is a scientist who studies plants in detail—how they grow, what they need, and how they change over time. Botanists might study climbing vines to understand how they adapt to different environments or to develop new plant varieties for food or medicine. These scientists work in universities, research labs, nature preserves, and botanical gardens.
  - Average Annual Salary: \$66,000 USD
2. Landscape Architect - Landscape architects design outdoor spaces like parks, gardens, and yards. They decide where to plant climbing vines on fences and walls to create beautiful, shaded, or private spaces. They think about how plants will grow and how they'll improve the environment and people's lives.
  - Average Annual Salary: \$69,000 USD
3. Agricultural Scientist - Agricultural scientists study how to grow crops better, including climbing plants like beans, peas, and grapes. They experiment with different growing methods, soil types, and support structures to help farmers grow more food. Some work with vines in vineyards or on farms.

- Average Annual Salary: \$68,000 USD

## NGSS Connections

Performance Expectation:

- 3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Disciplinary Core Ideas:

- 3-LS1.B - Growth and Development of Organisms
- 3-LS4.C - Adaptation

Crosscutting Concepts:

- Structure and Function - The vine's tendrils and twining stems have a specific structure that allows them to function as climbing tools.
- Cause and Effect - Vines grow upward toward light (cause) so they can access more sunlight for photosynthesis (effect).
- Adaptation - This vine species has adapted climbing mechanisms that help it survive and thrive in its environment.

## Science Vocabulary

- \* Tendril: A thin, curly part of a climbing plant that wraps around objects to help the plant climb upward.
- \* Photosynthesis: The process plants use to turn sunlight, water, and air into food energy to help them grow.
- \* Adaptation: A special body part or behavior that helps an organism survive in its environment.
- \* Tropism: The way a plant automatically grows toward or away from something in its environment (like growing toward light).
- \* Reproduce: To make new living things of the same kind; for plants, this often involves making seeds.

## External Resources

- Children's Books:

- The Tiny Seed by Eric Carle - A beautifully illustrated story about a tiny seed's journey and growth journey
- Plant a Little Seed by Christie Matheson - An interactive board book about planting and growing seeds
- From Seed to Plant by Gail Gibbons - A non-fiction picture book with clear illustrations of the complete plant life cycle