

# Using Plant and Flower Models to Enhance Botany Lessons



Plants are arguably the most overlooked aspect of our environment. Even those that claim to be nature lovers can fall victim to the shortsightedness that causes us to miss some of the most spectacular organisms on the planet. Don't let this happen to your students. Inspire a new generation of botanists with the help of 3B Botany models.

One of the best ways to invoke initial interest in a subject is to show a student how the topic relates to them on a personal level. The following lesson plan is one that can be used to get your students interested in the flora that surrounds them.

## Angiosperms and You:

A brief introduction to some of the world's most important plants

### Introduction:

Angiosperms play a vital role in the everyday lives of every human on this planet. They are *the* major source of food for people, whether it is directly or indirectly, as the feed for the animals that we eat. Beyond filling our stomachs angiosperms serve as a primary source of many consumer products from the basis for building materials and textile fibers, to the source of many herbs, spices, and the medicines that we use.

Today we are going to discuss the six plant families that contain some of the most important food plants. These are the grass family (Phocaea); the potato family (Solanaceae); legumes family (Fabaceae); the rose family (Rosaceae); the mustard family (Brassicaceae), and the squash family (Cucurbitaceae).<sup>1</sup>

### Family Phocaea: The grasses

- World's most important single source of food
- In the top five of the most diverse families of flowering plants
- 24 percent of the earth's vegetation are communities dominated by plants in this family
- Can be found on all continents, in many different habitat types from desert, to marine, to freshwater.<sup>2</sup>
- Wheat (*Triticum aestivum*)
  - Cereal grasses in the genus *Triticum*, with their edible grains, are some of the oldest and most important domestic cereal crops
  - Thousands of wheat varieties known to man, the most important being the one used to make bread, *Triticum aestivum*, greatest portion of wheat flour produced today goes to bread making
  - Characteristics- slender leaves, stems that are hollow in most varieties, and heads composed of varying numbers of flowers, ranging from 20 to 100. Flowers grouped together in spikelets,

each having two to six flowers. In most spikelets, two or three of the flowers become fertilized, producing the grains.

*Use the T21009 here to demonstrate the parts of the plant.*

*(See Fig. 1)*

- Wheat is the major crop produced by the world's farmland. About 230,000,000 hectares were sown annually in the late 20<sup>th</sup> century, producing in total approximately 600,000,000 metric tons. China is the world's largest wheat producer with an annual yield of 100,000,000 metric tons.
- Wheat is a major source of energy in the human diet and most of the wheat grown is for human consumption. However, 10 percent is for reseeding and industry uses grain to produce commercial products such as starch, paste, malt, dextrose, gluten, and alcohol. Surplus wheat and byproduct are used as feed for livestock.<sup>3</sup>



Fig. 1 — Wheat (*Triticum aestivum*)

### **Family Solanaceae: The nightshade or potato family**

- This family includes approximately 95 genera and 2400 species, many of which play important roles as food or drugs.
- The plants are found throughout the world but are most abundant in South America where 40 of the genera are endemic
- This family is characterized by solitary or clustered flowers with sepals and petals, five in number and fused; five stamens; and a superior ovary that is made by the fusion of two carpals. The flowers are readily noticeable and attract many insects.<sup>4</sup>

*Use the T21014 to demonstrate the unique characteristics of this family. (See Fig. 2)*

- Potato (*Solanum tuberosum*)
  - One of the most important members of the nightshade family<sup>4</sup>
  - Thought to be native to the Peruvian-Bolivian Andes, the potato is one of the world's most important food crops. Probably first cultivated domestically 1800 years ago in South America, the plant was brought to Europe by the Spaniards during the second

half of the 16<sup>th</sup> century. It spread in popularity and became the major crop in Ireland in the 17<sup>th</sup> century and a major crop in continental Europe and England in the late 18<sup>th</sup> century.

- The common potato is one of 150 species in the genera *Solanum* that is tuber-bearing. The tuber (swollen end of an underground stem) is the edible part of the plant.<sup>5</sup>
- The potato is also used in manufacturing textiles, confections, paper, adhesives, and as livestock feed.
- Some other important plants included in the potato order (Solanales) are tomatoes, bell peppers, eggplants, tobacco, and sweet potatoes. The plants in this order are used not only as food but also have drug, ornamental, and laboratory uses.<sup>6</sup>



Fig. 2 — Potato (*Solanum tuberosum*)

### **Family Fabaceae: The Legume Family**

- This family contains the pod fruit plants in which the seeds are released when the fruit (or pod) dries out and splits at the seams.
- Uses for the plants include not only food (they are high in protein and contain many essential amino acids) but they are also used to produce edible oils, for fiber production, and as raw material for plastics.<sup>7</sup>
- Any of hundreds of varieties of these plants are grown world wide primarily for their edible seeds<sup>8</sup>
- The Common Pea (*Pisum sativum*)
  - In the Western world the common garden pea is the crop of choice
  - It is the world's oldest cultivated crop, though its origins are uncertain
  - Beyond being an important food source, the little pea served as an experimental specimen for the monk Gregory Mendel in the mid-1800 century. His experiments are the bases for modern genetics
  - Characteristics - leaves are composed of three leaflet pairs. Flowers are reddish purple, pink or white. The fruit is a pod that

grows to be approximately 10 cm in length and inside is found 5 to 10 seeds.<sup>8</sup>

*Use the T21026 to help your students gain a full understand of the pea plant characteristics. (See Fig. 3)*



Fig. 3 — Common Pea (*Pisum sativum*)

### **Family Rosaceae: the Rose family**

- This family includes almost all of the commonly known fruiting trees and shrubs. Some of the members include: almonds, apples, apricots, cherries, peaches, pears, raspberries, and strawberries.<sup>1</sup> These plants are diverse and wide ranging.
- Sweet Cheery (*Prunus avium*)
  - Cherry trees are one of the many plants in this family grown for their edible fruit. Some varieties are used in furniture making for their beautiful wood and for ornamental purposes.
  - The trees are believed to be endemic to western Asia and Eastern Europe but by the time agricultural history began to be recorded they had spread all over Europe
  - They are grown all over the world today in any place that has winters that are not too severe and with moderate summers. The plants require a cold winter in order to blossom in the spring. Today the US is the number one producer of cherries with an annual crop of approximately 230,000 metric tons.
  - Cherry fruit is heart-shaped to globular, and approximately 2 centimeters in diameter. The fruit ranges in color from yellow to red to almost black.<sup>9</sup>

*The T21019 can be broken down and displayed to the students to illustrate the anatomy of a cherry blossom and other closely related plants. (See Fig. 4)*



Fig. 4 — Sweet Cheery (*Prunus avium*)

### Family **Brassicaceae**: the mustard family

- This family includes 350 genera of primarily herbaceous plants that have peppery-flavored leaves. A huge number of these plants have been altered and domesticated by humans and play important roles in our daily lives.
- Characteristics –The flowers of the species in this family form a Greek cross with four petals and an equal number of sepals. They have four long and two short stamens as well as a two chambered ovary, which grows above the other parts of the flower. The fruits produced by the family are pod like and can have a mucilaginous coating.<sup>10</sup>  
*Now show your students the T21020 which demonstrates the essential characteristics of this family. (See Fig. 5)*
- Oilseed Rape (*Brassica napus*)
  - The most important genera in the mustard family is *Brassica*, which includes cabbage, mustards and rapes.
  - The rape plant is used as a green in salads, for production of canola oil, and for cattle and birdfeed.<sup>10</sup> The plant is also used to produce biodiesel to power motor vehicles.<sup>11</sup>



Fig. 5 — Oilseed Rape (*Brassica napus*)

## Family Curcubitaceae: the gourd family

- This important family contains about 700 species of plants that are used for food or ornamental purposes. Some of the more familiar ones include melons (including the summer favorite watermelon), squashes, pumpkins, cucumber, and gourds.
- Distribution of the plants in this family is limited due to the fact that not a single species can tolerate cold temperatures or soil. They are extremely sensitive to frost and temperatures near freezing.
- Characteristics – grow either prostrate or climb tendrils. The family is a fast-growing one with long stalk and alternating palmate leaves. The majority of the species have flowers that are unisexual with five white or yellow petals. The flowers also contain five each of sepals, anthers, and carpals. The fruits of most species are fleshy, large, and have many seeds with a tough rind.<sup>12</sup>

*Bring in a pumpkin and a pumpkin pie for the class to share while they ask questions and discuss the lesson.*



## **Bibliography**

- <sup>1</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-73095>
  - <sup>2</sup> Encyclopedia Britannica Online: Academic <http://search.eb.com/eb/article-9111114>
  - <sup>3</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-9076739>
  - <sup>4</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-9068552>
  - <sup>5</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-9061051>
  - <sup>6</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-72959>
  - <sup>7</sup> Encyclopedia Britannica Online: Academic Edition <http://search.eb.com/eb/article-9047652>
  - <sup>8</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-9058846>
  - <sup>9</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-9023855>
  - <sup>10</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-9016252>
  - <sup>11</sup> Wikipedia [http://en.wikipedia.org/wiki/Brassica\\_napus](http://en.wikipedia.org/wiki/Brassica_napus)
  - <sup>12</sup> Encyclopedia Britannica Online: Academic edition <http://search.eb.com/eb/article-9028118>
- USDA Plants Database <http://plants.usda.gov/index.html>