

Bananas: The Same The World Over

Banana is the common name for the fruit and herbaceous plant that is part of the genus *Musa*. Bananas are one of the world's oldest and most popular fruits. They are very nutritious, generally inexpensive, and readily available. The banana plant is a large flowering plant that grows 6–7 meters tall. Each plant produces a bunch of bananas from a flowering stem.

Whether eating a ripe banana in the United States or in Europe, these store-bought bananas tend to taste the same. Part of the banana's popularity is due to its predictably delicious flavor. However, the uniformity that makes the banana so popular could also lead to its demise.

Banana History

As humans' hunter-gatherer ancestors roamed the jungle collecting food, they ignored the bananas they found. Wild bananas, which flower and reproduce sexually, produce hard seed cases with inedible seeds inside.

Occasionally, prehistoric humans found fruit on wild banana plants that did not contain seeds. These seedless bananas, when peeled, contained sweet, edible flesh. This is the edible banana that people know and enjoy today. Today's edible banana is a genetic mutation. The mutation produces tasty fruit but prevents proper seed development. The dark lines sometimes seen after biting into a banana are the stunted seeds.

Banana Sexual Reproduction

In nature, bananas reproduce through sexual reproduction. Sexual reproduction in flowering plants is similar to sexual reproduction in animals. Sperm cells are produced inside pollen grains. Pollen lands on the stigma, the female part of a flower. The pollen grows a long tube down to the plant's egg cell, and the pollen's nuclei move down the tube, fertilizing the egg cell. The developing seed contains the offspring, and the ovary begins to swell and develop into a fruit. Once again, the majority of bananas resulting from sexual reproduction are inedible.



A bunch of bananas hangs from the main stem of the plant.

Cultivating Sterile Plants

Because humans' ancestors enjoyed the banana so much, they spent much time trying to domesticate the banana. They took cuttings from stems and replanted them. Cultivating plants by taking cuttings is a type of asexual reproduction. Asexual reproduction does not involve joining gametes.

Banana trees have a stem structure beneath the soil called a corm. Corms produce thin, fast-growing stems called suckers. When bananas are cultivated, the suckers are cut off, taking some of the thick corm as well. The sucker with the corm attached is planted in the soil, and a new banana tree grows. The new tree is identical to the parent tree.

Using tissue cultures for banana production is gaining in popularity. Tissue from banana plants is taken to labs to be cleaned and sterilized. The tissue begins cell division in nutrient solutions until new tissue forms. The new tissue is separated to make hundreds—even thousands—of new plants. The plants are clones of the parent. The offspring banana plants are disease-free and grow prolifically.

The Importance of Sexual Reproduction

Sexual reproduction increases genetic diversity among individuals. If genetic diversity is low, there is low variation among individuals. Environmental changes in regions where banana plantations are located can be devastating due to the lack of variation among individual banana plants. If one plant in the plantation cannot adapt to changes, then none of the plants can, because they are all genetically identical.

Bananas Past and Present

Until the 1950s the world's favorite banana was the Gros Michel variety. The Gros Michel was grown on plantations and cultivated by asexual reproduction using cuttings from parent plants. A root fungus called Panama disease quickly spread through plantations across the world, killing banana plants. Because the plants were genetically identical, they were not



Commercially exported bananas are genetically identical.

equipped to defend against Panama disease. The Gros Michel variety of banana is not extinct, but it is not part of today's global production. The Cavendish banana took over as the global banana in the 1960s. The Cavendish variety is naturally resistant to Panama disease.

Stalking the Cavendish

A fungal disease called Black Sigatoka is stalking the Cavendish banana. Plantations of cloned banana plants are incredibly vulnerable to disease, and fungus moves easily around the world. If a person stands on soil containing fungal spores, these spores can travel on that person's shoes and spread across the world within hours.



Because banana plantations are filled with clones, they are more vulnerable to disease.

The natural world constantly battles disease. Diseases adapt and change. Organisms then adapt and improve resistance to overcome the diseases. Then the diseases adapt again, and so on. If a species like the banana has no genetic variety, its only hope for survival is intervention by science.

Are Bananas in Our Future?

It is too early to predict whether bananas will remain a mainstay of diets and economies worldwide. Recently scientists announced they would be sequencing the genome of bananas. Scientists hope to unravel the entire genetic code in the DNA of banana cells. Once the genome is read and understood, genes within the banana's DNA that help disease resistance can be enhanced and altered. It may also be possible to modify the banana's genome by adding a gene for disease resistance from other plants, such as onions.