CURRENT SCIENCE

Banana Splits

Do you like banana cream pie? How about banana bread or banana split sundaes? Better enjoy them while you can!

Scientists from the International Network for the Improvement of Banana and Plantain (INIBAP) recently warned that disease might soon wipe out one of the world's favorite fruits. Think a world without bananas sounds too weird to be true? Keep reading.

Sweet Herb

Bananas are the fruits of the world's largest *herb*, a seed plant without woody stems like those of trees and shrubs. Nearly 1,000 species of banana and *plantain* exist. A plantain is a large, firm banana, which is often cooked while still green.

Wild bananas, which grow in Southeast Asia, are full of hard black seeds that make them inedible. *Cultivated* bananas, which have been adapted from the wild to be raised as crops, grow in tropical regions all around the world. According to Charlotte Lusty of the INIBAP, more than 500 species of cultivated banana are grown for food. Unlike wild bananas, cultivated bananas are *sterile*—they don't have seeds.

The banana we munch in the United States is a sweet "dessert banana." Many of the varieties eaten throughout the developing world aren't so sweet. They're fried, grilled, stewed, and boiled—used more as a vegetable than as a dessert. They're also put into everything from banana ketchup to banana beer to banana flour.

For the first half of the 20th century, the Gros Michel was the sole dessert banana sold in North America and Europe. It was tasty but also vulnerable to a soil fungus called *Panama disease*. By the 1950s, Panama disease had virtually wiped out the Gros Michel worldwide. Fortunately, a sweet banana resistant to Panama disease existed. That banana, the Cavendish, is the variety we still eat today.

The End of the Cavendish?

Now the Cavendish is at risk. One major threat is a fungus called *black Sigatoka*, which attacks the leaves of a banana plant and makes the fruit ripen too early. It can cut crop yields by up to 70 percent and slash the number of years a plant produces fruit from 30 down to just two or three. Black Sigatoka was first found in Fiji in 1963 and has since spread around the globe.

Banana growers keep the disease at bay by spraying their plants with *fungicides*, chemicals that kill fungi. But the chemicals have been linked to serious health problems in banana workers, including birth defects and *leukemia*, a type of cancer in which the body produces an abnormal number of faulty white blood cells. Fungicides are also expensive, and many poor farmers in Africa, Asia, and Latin America can't afford them.

Recently, a new form of Panama disease, called *race 4*, began killing the Cavendish. Race 4 attacks a plant at the roots, so it can't be stopped by fungicide sprays. It has made its way through South Africa, Asia, and Australia, and scientists at the United Nations Food and Agriculture Organization say it will almost certainly continue spreading.

The Cavendish isn't the only banana in danger. Almost all edible varieties are vulnerable to black Sigatoka and race 4. That's bad news for millions of people who depend on bananas for food. In many African countries, bananas are the main source of calories. In Uganda, where each person consumes an average of 250 kilograms (550 pounds) of bananas per year, the word *matooke* means both "banana" and "food."

Save the Banana

Can anything be done to save the banana? Lusty says some advances have been made using traditional plant-breeding techniques, but progress has been moving slowly. Because cultivated bananas are sterile, breeders have had few plants to work with—only the rare mutants that produce seeds. In one project in Honduras, 30,000 banana plants yielded just 15 seeds for breeders to use. "It is very hard work," said Lusty.

One resistant banana is now being grown in Cuba, but reports have claimed that it tastes more like an apple than a banana. Some varieties of banana grow well only in certain environments, says Lusty, so the new Cuban banana might not be a good candidate for planting in other regions.

Some scientists are now testing other new bananas to see if they are resistant to disease yet still retain good flavor, texture, and shelf life. Despite a few successes, only five banana breeders in the world are currently producing improved bananas. "That is not enough!" said Lusty.

Even if scientists find a replacement for one variety of banana, hundreds of others are still threatened. Millions of people in the developing world depend on those varieties and could starve without them.

A world without banana splits might make Americans sad, but to half a billion people in Asia and Africa, a world without bananas could be devastating.

One Banana, Two Banana

When plants or animals reproduce *sexually*, the genes from two parents blend in their offspring. That blending yields a *genetically diverse* population of offspring, with each one having a different combination of genes.

Because cultivated bananas are sterile, they can't reproduce sexually. For thousands of years, banana growers have replenished and expanded their crops by planting cuttings taken from the stems of existing plants. The banana plants of every cultivated variety are virtual clones of one another, with nearly identical genes.

That lack of genetic diversity makes bananas especially vulnerable to disease. A diverse population is more likely to have at least some members with traits that make them resistant to disease.

Citation: "Banana Splits." *Current Science* May 2, 2003. Facts For Learning. Facts On File News Services. http://factsforlearning.2facts.com

Banana Split Questions

Name_____
Date _____
Block_____

First, read your article and number the paragraphs. Then, answer the questions about the reading, and provide the number of the paragraph(s) in which you could find the answer.

1. Define cultivated. How do wild and cultivated bananas differ in how they are reproduced?

2. Why does that difference make cultivated bananas more vulnerable to diseases? *(Hint: see One Banana, Two Bananas)*

3. What was the Gros Michel, and what happened to it?

4. What two organisms are attacking banana plants, and what kind of organism are they?

5. What chemicals do farmers spray on their banana cops to protect them from disease, and what is problematic about those chemicals?

6. Why don't the chemicals in the previous question work against the Race 4 that is attacking banana plants?

7. Write a paragraph below that summarizes the Banana Split article; briefly and simply, say what's going on with the banana! You should state the problem, related information, and possible solutions.

For More Information, try

• *Scientific American Science Talk Podcast: Can Science Save the Banana?*
http://www.scientificamerican.com/podcast/episode.cfm?id=7BA7726C-EBE6-29DB-B21F7FF464B293E9

• *Science News: Scarce-Banana Scare--But don't kiss that banana good-bye yet:*
http://www.sciencenews.org/view/generic/id/3637/title/Food_for_Thought__Scarce-Banana_Scare%2B%23151%3BBut_don%2B%23146%3Bt_kiss_that_banana_good-bye_yet

• *National Public Radio: Article about Cavendish Bananas and Dan Koeppel's book*
http://www.npr.org/2011/08/30/139787380/bananas-the-uncertain-future-of-a-favorite-fruit

• *International Network for the Improvement of Banana and Plantain:* http://bananas.bioversityinternational.org/index.php and click on "Why Bananas Matter" (top right)

- Popular Science: Bananaland pictures and article: http://www.popsci.com/gear-gadgets/gallery/2005-06/bananaland

- http://www.freshforkids.com.au/fruit_pages/banana/banana.html
- http://www.dolenz.co.nz/products/bananas/cavendish-banana.html

Weir, Kirsten. "Bananas Split." *Current Science*. 02 May 2003: 8+. *SIRS Discoverer.* Web. 13 Jan 2012.