Cathy Becker
Bio 116H
Banana assignment

"The banana has changed the world, but for all practical purposes it can't change itself and it has so far not cooperated with human efforts to make it turn over a new leaf."

To explain this quote, one has to take it piece by piece. The first part refers to how the banana has changed the world. This is certainly true when it comes to U.S. involvement in Latin America. As Dan Koeppel discusses in the "Bananas, A Storied Fruit with an Uncertain Future" episode of Fresh Air, the United States intervened in Latin American countries no fewer than 20 times on behalf of multinational banana companies. These include installing a puppet leader in Honduras, overthrowing the democratically elected president of Guatemala, and paying protection money to terrorist organizations to put down worker unrest in Colombia. These "banana republics" were responsible for much of the civil war and death squad activity throughout Latin America in the second half of the 20th century. It was all done so the banana barons of United Fruit and Standard Fruit (later Chiquita and Dole) could sell millions of bananas in the United States at half the cost of North American fruits such as apples.

Unfortunately, for all the blood, sweat and tears shed over this tropical fruit, as Koppel writes and discusses, the banana is likely to go extinct within our lifetimes. One reason is that it cannot change itself. By this, Koeppel is referring to the fact that the Cavendish banana, the type grown in Latin America and shipped to the United States in such large quantities, is seedless and sterile. It reproduces asexually -- or rather it is reproduced by humans who take a cutting from one banana tree to grow another. This means that every Cavendish banana tree is a clone of its parent, and every Cavendish banana grown is genetically exactly alike. This lack of biodiversity means that this crop is particularly vulnerable. If a disease comes along for which it has no defense, the entire crop will be wiped out, and that is exactly what we are seeing with the Panama fungus destroying Cavendish banana crops on other continents. Panama disease is not yet in Latin America, but scientists say it is only a matter of time before it gets there.

Nor has the Cavendish banana cooperated with human efforts to make it turn over a new leaf. Koeppel discusses such efforts in Chapter 28 of his book *Banana: The Fate of the Fruit that Changed the World*, which recounts his tour of the Honduran Agricultural Research Foundation with its director, Juan Fernando Aguilar. One way to introduce new characteristics into a plant or animal is to cross-breed it with other varieties that can bring different traits. The result is a hybrid that hopefully has the best characteristics of both. So while the Cavendish might bring the taste consumers are used to, another variety might bring a thick skin or disease resistance. This is standard practice in breeding many other staple crops as well as livestock.

However, as Koeppel writes, this task is considered so difficult in the banana that only a handful of scientists have even tried. Koeppel discusses the work of Aguilar's predecessor Phil Rowe, who crossbred 72 varieties of seeded and seedless bananas during the 1950s to find a replacement for the Gros Michel variety, the type grown and shipped to North America until it fell victim to Panama disease. The best he could come up with was the current day Cavendish, then considered inferior in taste and toughness and impossible to use as a replacement to the Gros Michel. However, at the last minute when there was no other alternative, banana conglomerates did adopt the Cavendish, requiring great changes to their sorting, storing, transport, and shipping operations. And without an alternative, consumers embraced it too.

Today Aguilar's foundation is working to find a replacement to the Cavendish, and they have not had much luck either. Koeppel describes their painstaking work, cross-breeding acres and acres of hybrid banana trees, storing the fruit in a ripening room, peeling and tracking up to 100,000 bananas a week, then gnashing them into a pulp to look for tiny seeds. Because most of the varieties being bred are seedless, seeds are found in only 1 out of every 10,000 bananas. The seeds are then taken to a lab, where the embryos are removed and sprouted in a test tube. Yet only 1 percent of these embryos grow correctly, meaning that of all the bananas grown at the foundation, only one in a million leads to a tree that can be transplanted into a greenhouse. Even then, the tree has to be able to withstand parasites and disease in an unprotected field, and it has to be able to reproduce on its own. After 50 years of research, the foundation has come up with just one variety of banana that could possibly be considered a replacement to the Cavendish.

So what is the solution to this dilemma? When the Cavendish banana crop is wiped out, does that mean the end of bananas outside of tropical areas where they are grown? Not necessarily. Koeppel discusses genetic modification as one possible solution to this problem. In genetic modification, scientists would transplant genes that confer resistance to Panama disease from another banana variety directly into the genome of the Cavendish banana. Genetic modification is controversial for plants such as corn because they pollinate, and modified pollen can be blown into fields of corn that is not genetically modified. However, Koeppel does not see this problem with the banana. Bananas are seedless and do not pollinate, so they could not accidentally spread modified genes to unmodified plants. The plants reproduce only through cloning themselves.

I can see how genetic modification could provide a short-term solution to the banana problem. However, it does not address the underlying problem behind the demise of first the Gros Michel variety and now the Cavendish variety of banana by fungal disease. That problem is the lack of variety in the crop. Monocrops have no genetic variety, which makes them extremely vulnerable. Even if the Cavendish is engineered to resist this particular fungal disease, at any point the fungus could mutate into a form that it has no resistant to. This new fungus would destroy the modified Cavendish, and we would have to genetically engineer another variety.

There is another solution based not on monocropping but on genetic variety, which is that consumers could learn to live with seeds in their bananas. One reason the banana work at the agricultural foundation in Honduras is so painstaking is that they are breeding seeds out of the banana. Yet the only way they can get a variety of banana that is resistant to the fungus is to cross it with seeded bananas. The entire breeding process rests on a contradiction. What if they find a banana that is hearty, transports well, tastes good, and is resistant to fungus, but has seeds? Would that be so bad? People eat around seeds in apples, oranges, watermelons, and countless other types of fruit. They even eat the seeds of fruits like strawberries, tomatoes and kiwis. The fruit companies never thought consumers would accept the Cavendish after the Gros Michel, and yet they did. Most people today don't even know there was a different variety of banana in the 1950s. The same could conceivably happen with a new seeded variety of banana.

The alternative may be to simply eat locally. For us in Ohio, that means going back to apples. This would have the added advantage of saving on transport costs in a world where fossil fuels becoming prohibitively expensive. There is a lot to be said for eating locally, and it is something people should strive for most of the time. But as Terry Gross said, I would miss not having a banana at breakfast, and I am not alone. If given a choice between seeded bananas sometimes or no bananas anytime, most people would likely go with the seeded bananas and be happy about it.