



# BANANAS

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# MOTIVATION: WHY BANANAS?

- Bananas are botanically berries
- Bananas are one of the most energy-dense fruits and contain lots of nutrients
- Bananas are the most valuable fruit crop in the world
- The average person in North America eats 100 bananas per year

# SOME EARLY HISTORY

- Originally from New Guinea
- Expanded further West over time:
  - First Southeast Asia (500BC)
  - Then Africa (1000AD)
  - Finally Central America (1500AD)



# MORE HISTORY

- Sharp rise in popularity in Europe and North America in late 19<sup>th</sup> century
- Extreme economic inequality: 10x more expensive in US than in South America but still cheaper than any local fruit
- *United Fruit Company* and *Standard Fruit Company* dominate the market
  - Today re-branded as *Chiquita* and *Dole*



# MORE HISTORY

- Corporations buy of huge amounts of land and infrastructure in Honduras and Guatemala
- Exploitation of local population for cheap labour
- Power and influence on governments lead to extreme levels of corruption
- Coined the term “banana republic”



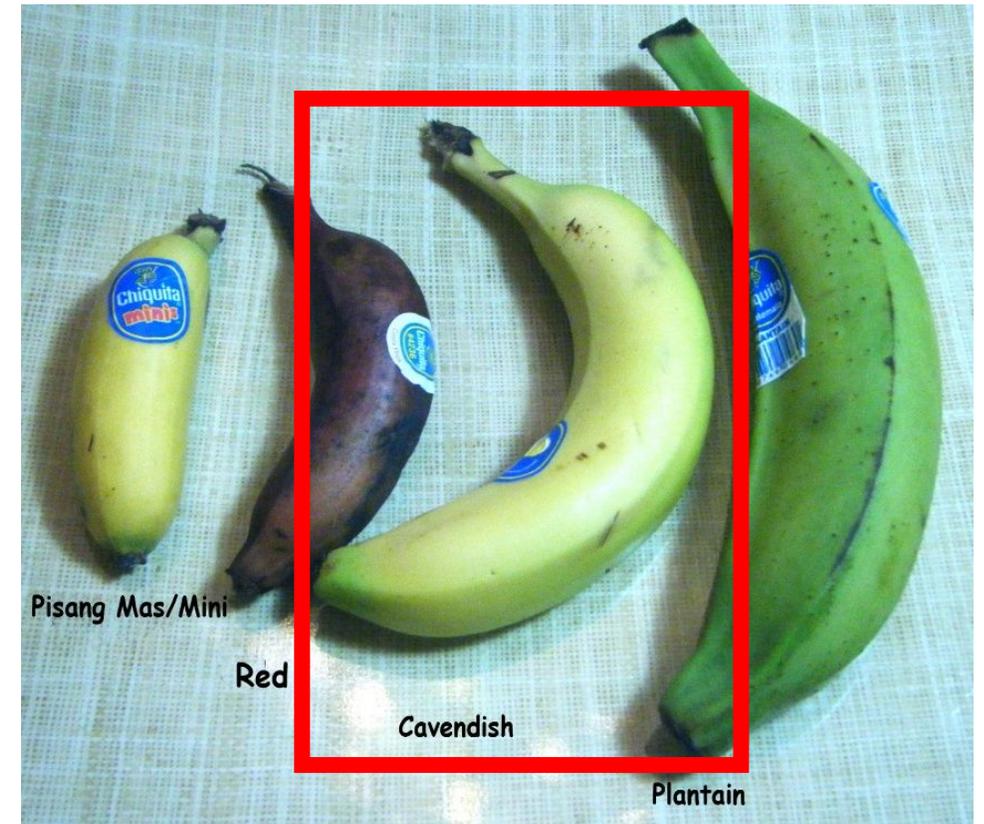
# TECHNICALLY, THERE ARE MANY DIFFERENT TYPES OF BANANAS

- Some aren't yellow
- Some aren't sweet
- Some have seeds
- ...



# IN MANY PARTS OF THE WORLD, PEOPLE ONLY CARE ABOUT ONE TYPE OF BANANA

- Thick peel makes it easy to handle
- Grows very densely on bushes
- Moderately sweet taste and medium starchiness appeal to a wide audience



# THE CAVENDISH CULTIVAR IS RELATIVELY YOUNG

- Until 1950, the most common banana was the *Gros Michel* cultivar
- Similar traits to the Cavendish
- Sweeter, fruitier, more “exotic” flavour
- Softer texture, stronger smell

**... What happened?**



# MODERN BANANAS ARE A STRANGE FRUIT

- They have no seeds
- They only reproduce via offshoots
- Every banana is a genetically identical clone



Photo Credit: Tim Straubinger

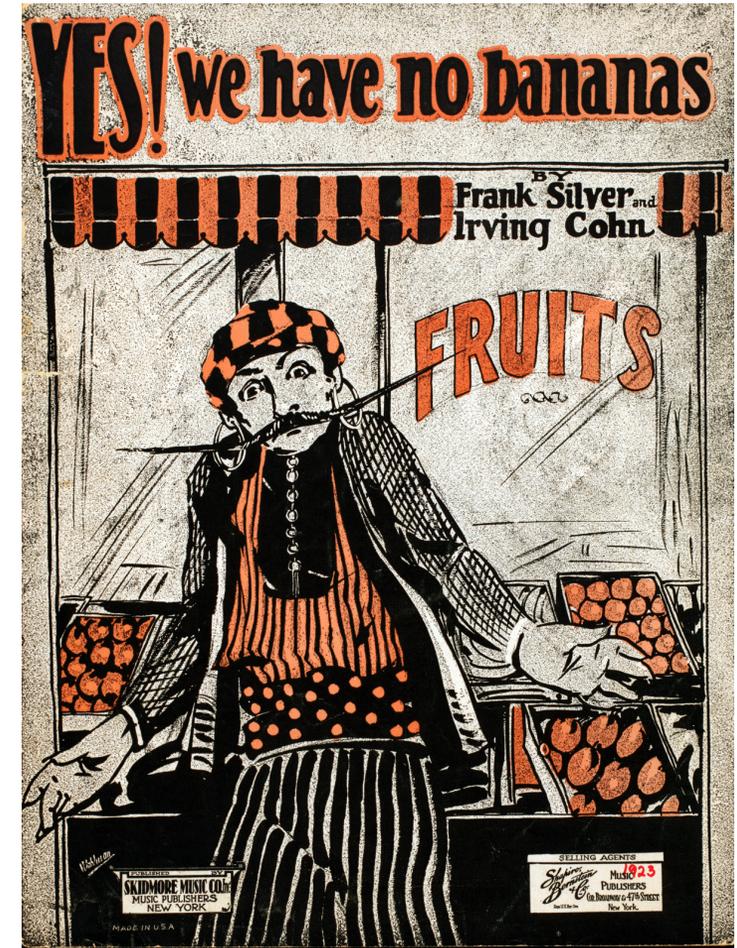
# THE PANAMA DISEASE

- Fungus *Fusarium oxysporum f.sp. cubense*
- Hems plant growth, causes fruit rot
- Has high chance of transferring to offshoots and nearby plants
- Resistant to fungicides, can only be contained by *phytosanitary measures*



# THE PANAMA DISEASE

- Spread rapidly in the 1950s
- Infested and destroyed most of the world's plantations
- Made the Gros Michel unsuitable for mass production by early 1960s
- Whole industry shifted to Cavendish cultivar that is immune to the disease



# ARTIFICIAL BANANA FLAVOUR

- Artificial banana flavour (*isoamyl acetate*) tastes like Gros Michel bananas
- The flavour never changed since it is very cheap to produce and familiar to customers
- Ironically, in modern experiments most people describe the taste of Gros Michel bananas as “fake”

**FUN FACT!**

# SO EVERYTHING'S FINE NOW, RIGHT..?

- Around 1989 a new strand of panama disease appeared in Taiwan
- It specifically affects Cavendish bananas
- It spread slowly at first but by 2015 it made its way to Africa
- In 2019 it appeared in South America

**SO EVERYTHING'S FINE NOW,  
RIGHT..?**



**SO EVERYTHING'S FINE NOW,  
RIGHT..?**



**[Redacted Name]** 2 days ago

But banana is one of three foods  
that I dislike 😐

# FUTURE WORK

Source: Wikipedia

- Breeding bananas is almost impossible
- Fortunately there are already other bananas than the Cavendish

Gros Michel and Cavendish bananas are triploid and thus attempts at meiosis in the plant's ovules cannot produce a viable gamete. Only rarely does the first reduction division in meiosis in the plants' flowers tidily fail completely, resulting in a euploid triploid ovule, which can be fertilized by normal haploid pollen from a diploid banana variety; a whole stem of bananas would contain only a few seeds and sometimes none. As a result, the resulting new banana variety is tetraploid, and thus contains seeds; the market for bananas is not accustomed to bananas with seeds. Experience showed that where both meiosis steps failed, causing a heptaploid seedling, or when the seedling is aneuploid, results are not as good.

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# THANK YOU!

Photo Credit: Tim Straubinger

