

# UnTextbooked

*A history podcast for the future.*

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Guest	Jennifer Eaglin, PhD
Season - Episode	2 - 11
Released (YYYY-MM-DD)	2021-11-22

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Gabe Hostin 0:05

One of the greatest challenges our generation faces is a growing need to transition away from fossil fuels. Governments and industries will eventually have to find renewable alternatives. I'll textbook producer Jessica Chiriboga has been looking at the long history of one of those alternatives. ethanol.

Jessica Chiriboga 0:22

Ethanol is a lot more complex than we think it is. It's not just an alternative fuel source that has a lot of promise to be a potential replacement for oil, but it's it's a product that has a very contentious history.

Gabe Hostin 0:36

Ethanol is a liquid fuel that shares a lot of similarities with gasoline. It's a refined alcohol made from plants like corn, potatoes and sugarcane. And one country that's made a large investments ethanol is Brazil.

Jessica Chiriboga 0:49

also unique because it's a product that Brazilian politicians said sort of at the turn of the 20th century. We are going to make this the national product this is going to be one of our the products that we're going to invest a lot of money and time into, even through a military dictatorship that came into Brazil, sort of in the 70s and so and even a democracy now that we have in 21st century that says we're gonna stick to ethanol, we want this to be part of our political system, regardless of sort of their political affiliation. That's That's pretty remarkable that ethanol is very relevant to how Brazilians see themselves and how they work and how they

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drive their car to work. But it's also a product that's created a lot of discontent in resume culture. So it's a very labor intensive process. And in a country like Brazil or where inequality is really high. You have these laborers working for very low wages. So in following its history, you can literally tell the history of Brazil.

Gabe Hostin 1:52

In this episode, Jessica interviewed Dr. Jennifer Eaglin, the author of *Sweet Fuel*, a political and environmental history of Brazilian ethanol. I'm Gabe Hostin, and this is UnTextbooked. Stay tuned.

Jessica Chiriboga 2:09

UnTextbooked Hello, Dr. Eaglin, thank you so much for joining us.

Jennifer Eaglin, PhD 2:19

Thank you guys for having me.

Jessica Chiriboga 2:21

So where did this sugar plant come from?

Jennifer Eaglin, PhD 2:24

So sugar is actually native to New Guinea in Southeast Asia and then re cultivated first off the coast of Africa, then later brought by ship to the Americas where it really turns into this massive agricultural product and for Brazil, I mean, this is really the foundation of the expansion of the Brazilian colony. So Brazil as a colony was founded in 1500. But sugar really made its arrival sometime within the next 20 or 30 years, and it's going to become the most dominant agricultural product for the Brazilian colony for basically the next century. Right. And in this time period, Brazil produces something like 90 plus percent of all sugar in the world is produced in Brazil, in this period, and so there are lots of studies that talk about how the foundation of Brazilian society is so tightly linked to sugar production, sugar, trade sugar and and the population is shaped around it right where this is going to drive. The expansion of the slave trade to Brazil and not just to Brazil. It I mean, it is important to note the sugar trade while Brazil dominates it. So early on is really the foundation of the transatlantic slave trade. And so these are all parts of what have shaped the world we live in today. Really, and sugar is is at the foundation of it, and I'm one of the things I like to highlight in my own classes is why was sugar such a big deal, right? I mean, yes, we all love sugar and sugary things certainly. But what what did this spice bring to the table that made it so important? And one of the points I actually make is one right now when we want to preserve food, we put it in the refrigerator, but in a world pre refrigeration, the key ways to preserve something were with salt or with sugar, right so sugar was also part of preserving food, and also as part of making food that was going bad tastes good, right. So these are all things that become very important in a world where access to food is changing, right what people are eating as the world is also at this time period as populations

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are shifting also. toward different styles of living more population dense locations. Sugar is going to be an important part of this changing way of living.

Jessica Chiriboga 4:56

How did Brazilians

go from this sugar plant to producing ethanol as a fuel source?

Jennifer Eaglin, PhD 5:02

So actually,

ethyl alcohol is the technical term for ethanol and it can be produced from basically any starchy agricultural product that you can think of here in the United States. We produce ethanol from corn in the United States. In Brazil, they produce ethanol from sugarcane, but these are not the only two countries to experiment with ethanol production. So actually, in Germany, they produce ethanol from potatoes. And in France, they produce ethanol from grapes. The difference between drinking alcohol and ethanol is the level of purification of the alcohol and then also an additive basically an additive to make sure that it's not drinking grade essentially. So to that point, ethanol was a side product along with all these other side products of sugarcane, right so sugar was the main export, but in this process of producing sugar, you would have this byproduct which is molasses, which you could then reuse for all these other things which included processing molasses into ethanol or drinking alcohol. So that technology that knowledge that you could use it as a fuel have been around basically as long as the internal combustion engine has been around. And so actually, in the United States, we had early investment in the use of ethanol from corn, actually, Henry Ford, Thomas Edison, and some other leading minds of this early 20th century period were actually major supporters of using ethanol rather than gasoline for or rather than petroleum to power vehicles. But for a country like Brazil, and as was the case in Germany and in France, these are countries that at the beginning of the 20th century did not have large oil reserves. And so this is an in deep contrast the United States where we have these huge oil reserves that are really going to help favor petroleum, the use of petroleum as a fuel over the use of ethanol. So in the case of the Brazilian government by 1930, they're going to mandate the use of ethanol in their national fuel supply of at a 5% mixture rate. And so these are all ways that the government is going to push the expansion of the ethanol industry.

Jessica Chiriboga 7:23

To you mentioned that the government is pouring this money into ethanol as a product. But what makes ethanol so attractive versus other products like coffee?

Jennifer Eaglin, PhD 7:34

Well, this is an excellent question. Jessica's. So in the early 20th century, Brazil has a problem, right? So basically, when we look at this, this long, DeRay history of Brazil there are these major

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products that come along that define the Brazilian economy. So as I already said, that first century, we're really talking about sugar, right sugar is the defining agricultural product that drives the Brazilian economy, the Brazilian colonial economy as it were, after that, really sugar already begins to go into the client and why does you're going to the client in the 17th century, a lot of it has to do with increased competition from other major sugar producing regions, particularly in the Caribbean. So as increased competition emerges, we're going to see the rise of the mining industry. So particularly, we're going to see the discovery of gold, which is going to drive a gold rush that makes the California Gold Rush look like collecting a few coins for a couple of years, right? I mean, we're talking about decades on decades. I mean, nearly a century driven by the discovery of gold and later diamonds. And in this the mining demand from mining is also going to drive a massive expansion in the importation of slaves, because as sugarcane production was declining, actually there was some indication that the importation of slaves was also starting to wane. But mining is a another labor intensive product that brings a huge influx of Europeans trying to capture this, the wealth associated with it, and also needing to bring a massive labor source along with them and so we're going to see a huge influx in the importation of slaves, African slaves in this time period, then really, as the mining industry is this gold rush, it's golden diamond rashes, is really starting to wane. That's when we see the rise of coffee. And so coffee is then going to reshape the world that we live in, in a whole, a whole nother way. Right. So Brazil is then going to become the largest coffee exporter in the world, by the late 19th century. And and and it comes to define Brazilian, the Brazilian economy, right. The government's basic job is to help support the production and exportation of coffee. And so Brazil's over producing coffee for more than the world market can consume. And so by the late 1920s, we're going to run into a huge coffee crisis that then is going to be matched with a global crisis being the Great Depression and agricultural markets are going to collapse. And so now coffee, the coffee industry and the sugar industry, which has also been struggling through the early 20th century are they're going to look to the government to say look, we we need support, right? And so they're going to get the Brazilian government to begin investing quite a bit in supporting coffee and in supporting the sugar industry and the primary way that the government is going to support the sugar industry is by mandating that the sugar producers redirect some of the excess sugar that they're that they're putting out onto the market as, as there's no export market really to sell it to right. They're going to mandate that they start repurposing and reprocessing some of that would be excess sugar into ethanol to redirect toward their own fuel supply. And so this is this is a lot of what's going on in the 1930s. And sugar producers are not very happy about it at first, right like we have a good thing going we want to just keep producing a lot of sugar, but they are slowly going to reorient toward really creating by by government demand creating this this ethanol demand and that's going to really pay them back when World War Two breaks out and export markets and imports of petroleum are going to dry up and they've already got this industry that by government demand had been growing over the last 1015 years. That's going to be able to provide an alternative fuel source during these limited import years. So that's how people felt about the ethanol industry initially, but one of the other things I always find interesting in Brazil is how normalized it becomes. When you talk to Brazilians today. It's like oh, yeah, ethanol is not a big deal. Like it's been part of their energy

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infrastructure for so long. And that foundation really began in the 1930s because of the Great Depression.

Jessica Chiriboga 12:09

So do Brazilians see ethanol as this green, environmentally sustainable product or does it have an environmental cost?

Jennifer Eaglin, PhD 12:19

I talk about this a good deal in my in my book, the marketing of ethanol has changed over time. So So when I talk about ethanol in the 1930s, it was primarily to support a sugar industry that was in distress in a difficult economic time. It was also to defer or redirect defray costs of petroleum imports for a country that did not have large petroleum reserves. Right. And this is going to be the foundation of the way that people talk about ethanol for four decades, right? So this, this was the foundation of the way that people were talking about in the 30s or 40s. And all of their promotion is going to center around how this program is saving Brazil money. And so it's not until the 1980s and 1990s that they're going to remark it as a product that is good for the environment as climate and and environmental issues are going to gain more attention. And as oil prices are going to fall back to levels below pre oil crisis levels. And so this is when we're going to see a lot more attention on the product as a environmental savior. Right. So so even today, I think opinions about ethanol in Brazil, from what I can see is less focused on their environmental benefits, then perhaps the way that we in the United States perceive the industry in Brazil, even different than the way that ethanol is presented to us in the United States and more a regular part of their energy infrastructure.

Jessica Chiriboga 13:59

is ethanol better or worse for the environment than gasoline?

Jennifer Eaglin, PhD 14:05

It depends on the the perspective that we want to take on the fuel. It does not have a carbon emission in the same way that fossil fuels burning fossil fuels emits carbon fundamentally, but this does not mean that it comes with no cost right. aldehydes of the variety like when we think about aldehydes we think about formaldehyde and which is known to be toxic, or aldehydes. There's an increased release of aldehydes that affect the quality of the air that comes along with burning ethanol and people don't talk about that a lot. Also, as I talk about quite a bit in my in my own book, the production of ethanol is also going to come along with other byproducts, particularly Vanoss, which is a liquid byproduct of the ethanol distillation process for every liter of ethanol produced about 10 to 15 litres of vinous are also produced but specifically in earlier periods were produced and then redirected and dumped into local waterways right. So actually, when we talk about the the big picture, we are talking about huge amounts of of waste associated with a an industry that has been marketed as environmentally beneficial industry. Now, the industry has invested quite a bit in repurposing a lot of these byproducts, particularly Manasses been reused as a as a fertilizer option. And so when we say is it better for the

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environment than petroleum based gasoline? I think in an immediate sense, yes. In a long term sense. I think that's a more complicated question, and we have to think about those in a more holistic fashion when we start talking about ethanol as this environmentally beneficial industry when actually there are tons of environmentally dangerous things that have been associated with the industry for quite some time.

Jessica Chiriboga 16:08

So in your book, we meet the Catholic father Tiago who said, anyone who buys ethanol is pumping blood into his tank. Ethanol is produced by slaves. What does he mean by this?

Jennifer Eaglin, PhD 16:23

I love that quote. It's so powerful and it brings attention to one of the other aspects that is under addressed when we talk about the full cost and benefit of the ethanol industry. And so he's particularly talking about that slave labor was an important part of the expansion of the sugar industry, the sugar industry and its success in Brazil could not have happened without the importation a barge amounts of enslaved bodies, right and the labor that they were forced to perform to produce sugarcane, which is a very labor intensive product. So the expansion of the ethanol industry is fundamentally the expansion of the sugar industry and the expansion of the sugar industry has and continues to rely heavily on as Father Tiago is alluding to. exploited bodies exploited, underpaid, manual labor, labor laws are changed. In the in the mid 20th century to the benefit of sugar and ethanol producers. And and so as Father Geragos really referencing this form of exploitation continues well into the 21st centuries, one could associate the expansion of the ethanol industry with a a reimagined version of exploitative labor that has at times been compared to slavery.

Jessica Chiriboga 17:50

What lessons does Brazilian ethanol give for alternative fuel use in other countries?

Jennifer Eaglin, PhD 17:57

One of the key things I like to highlight is the Brazilian the national ethanol program and the Brazilian ethanol industry. As we know it is the the most successful and really the only large scale example of a fuel alternative for cars that has been successfully implemented. In the world. And so what examples as the show does this give us number one that alternatives are possible large scale alternatives to petroleum based fuel is possible for cars right. And but it also is it also tells us that we have to look a broader approach to what success means, in I believe, like 1980, about less than 1% of all cars in Brazil ran exclusively on ethanol by 1985. Over 95% of all new cars on the road ran exclusively on ethanol. So this rapid change is possible and rapid change is possible in a short period of time. On the other hand, while 95% of all new cars in Brazil, in 1985, ran exclusively on ethanol by the 1990s, the program the head essentially collapsed and about 10% of new cars ran excuse me on ethanol by the mid 1990s, that had fallen back to about 1% of new cars. So well change of our energy, infrastructure is possible. The commitment is requires adaptation and is of a longer trajectory. And so when

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other countries are looking to invest in alternatives to carbon based fuel options, our commitment needs to be really very high. The government the Brazilian example illustrates how much the Brazilian government actually invested to make sure that the ethanol option continued to be an option, right? Even even when it was not necessarily cost efficient. And it came with a lot of costs. And so we have to we have to talk about it in a broader context, but it is an important example of what what could be but also what we want to do better. And when I say what we want to do better, it's we want to have conversations that are not excluding massive amounts of the population, when we call it a success or a failure, but rather have broader conversations about what are the costs of these alternative options. And, and how can we address them as we're developing them?

Jessica Chiriboga 20:27

Thank you so much, Dr. Eaglin. Dr. Jennifer Eaglin is the author of the upcoming book sweet fuel, a political and environmental history of resilient ethanol. Dr. Eaglin where can people find you online?

Jennifer Eaglin, PhD 20:41

I am actually woefully not very great with social media, but I'm actually currently on fellowship up at Harvard. And you guys should check out both OSU and Harvard's events around energy and Latin America which are abundant and awesome.

Gabe Hostin 21:10

Dr. Jennifer Egan is an assistant professor of environmental history and sustainability at Ohio State University. Jessica Chiriboga is a sophomore at Dartmouth College. Our website is [untextbooked.org](https://untextbooked.org) and we're on social media at UnTextbooked. Our music is by Silas Bowen and Coleman Hamilton UnTextbooked is edited by Bethany Denton and Jeff Emtman. Fernanda rain is our executive producer. UnTextbooked is a project of God history, an organization that believes in a world where all young people advance civic well being for themselves, society and the planet.

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