00:01

Imagine a farmer growing coffee in Nkongsamba, in the Moungo region of Cameroon. Let’s call him Mr. Ewané. Mr. Ewané lives out of a small plot of land, growing food to feed his family, and coffee, to earn a very modest income. While many of us in the Western world debate about climate change, Mr. Ewané knows it is real. The rainy season is becoming more erratic, impacting his coffee production that has been declining year after year.

00:35

Mister [unclear] is by no means responsible for climate change. His own CO2 emissions are below 200 kilograms per year, while we in the developed world emit 30 to 60 times more than he does. Our way of living -- his problem. The great story is that Mister [unclear] can improve his standard of living while removing CO2 from the atmosphere and helping fight climate change. This is not about trees. It's much smaller. Sounds interesting? Well, bear with me.

01:12

In order to fight climate change, we need to reduce, like crazy, our greenhouse-gas emissions, halving, in the next 10 years, the 50 billion tonnes that we emit annually, and then aiming to halve again in the following decade. While reduction is needed, it will not be enough to get us to zero emissions, [which] is needed to stabilize climate. There will be, for a very long time, residual emissions, from some industrial processes, from aviation, from agriculture, etc. Billions of tonnes of residual emissions, even when we have reduced all that we can. So we can't be zero emissions, but we can be net-zero emissions: that is, removing from the atmosphere, as much CO2 as we emit annually. And maybe, one day, remove more than we emit, to restore our climate balance.

02:16

That's when Mister [unclear] comes into play. He has been capturing CO2 through the growth of his crops, year after year. Photosynthesis that drives the growth of crops is by far the most efficient way to capture CO2 from the atmosphere. But if nothing is done, that same CO2 goes straight back into the atmosphere when plants decompose or are burned. But the good news is that we can stabilize the carbon contained in the leftovers from the coffee cherries of Mister [unclear]. That means we can remove CO2 year after year and help fight climate change. And what if that same technology would allow Mister [unclear] to improve the productivity of his fields, hence his standard of living?

03:08

Now you start to see the opportunity. It’s called “biochar.” Let me say right away that biochar is by no means a magic wand that will take us out of the climate crisis. It's one of the many solutions to help remove CO2 from the atmosphere. But if used smartly, it's just an amazing thing. Biochar is carbon resulting from pyrolysis, that is, heating biomass at high temperature without oxygen. Any kind of plant-based, dried biomass contains about half of its weight in the form of carbon. And it is this carbon that is extracted and stabilized to create biochar. Biochar is essentially carbon that was captured from the atmosphere by plants and transformed into a very stable form of carbon. It looks like charcoal powder.

04:04

The first amazing property of biochar is that it remains stable for hundreds of years, even if put in the soil, where biomass will normally degrade. Think about it. The CO2 captured by plants through photosynthesis and converted into biochar stays in the soil, and so stays away from the atmosphere, for hundreds of years. So we have a carbon removal situation, and this is good for the climate.

04:36

The second amazing property of biochar is that, when mixed with topsoil, it improves the soil quality, hence, crop yields. This is especially true for poor, dry and acidic soils that lack nutrients. Putting carbon in the soil has been known empirically for hundreds of years as a way to improve soil quality. It was used in some parts of Amazonia prior to the arrival of Europeans, and it's still used today in some parts of Asia.

05:10

Biochar's effects on soil come from its microstructure. When magnified, biochar looks like a carbon sponge, with hundreds of square meters of surface per gram of biochar. This ultraporous structure helps retain water and nutrients. Biochar also favors the development of microbial life into the soil that is most needed for plants to absorb nutrients.

05:39

And last, given its high pH, biochar helps counter the negative effects of soil acidity. Using biochar allows to reduce, or even eliminate, the need for fertilizers, cutting costs for farmers and helping the environment. And the great thing is that, given its stability, biochar needs to be applied just once, and its effects last for decades. And then, there's a bonus. The production process of biochar generates flammable gases. Part of those gases are used to heat the reactor

where biochar is produced, and the remaining gases can be used to generate renewable heat or electricity. So not only the production process of biochar is self-sustained, but it is a source of additional renewable energy. Quite incredible.

06:35

So we have this amazing product that is a climate solution, an agricultural solution and a renewable energy solution. And now, you start to wonder: "How come this biochar thing that he's talking about is not widely used all over the place? What's the problem?" Well, the answer is plain and simple: costs. Most biochar produced in the last years had to be sold at prices as high as 1,000 dollars per tonne, to cover production costs. That made biochar uneconomical for most usages. And so, despite its wonderful properties, it has remained a niche product. But things started to change in the last couple of years. The recognition of climate change started to shift our behaviors, leading companies and states to commit to net-zero trajectories. Some innovative companies committed to an accelerated net-zero trajectory; started to buy, at a high price, biochar-based carbon credits for their long-term CO2 removal effects. That changed the economics of biochar, as all of a sudden, the climate benefits of biochar could help subsidize its agricultural usage. As a consequence, biochar is emerging as a credible CO2 removal solution, especially that it is one of the very few that are available today for scaling. The technology is mature. The scientific backing is here. The economics could work. And the potential is huge. In Africa alone, we estimate that half a billion tonnes of agricultural residues are available to produce biochar. That means about the same amount of CO2 being removed every year from the atmosphere, and there are many more billion tonnes in the rest of the world.

08:38

So let's make biochar a solution at scale. For this, we need three things. One, access to biomass. Biochar production requires a large quantity of dry biomass, ideally sourced close to the production facilities to avoid transportation costs and emissions. It needs to be residual biomass so it does not require additional land to grow it. Most biochar companies today use wood residues, like sawdust or branches, to produce biochar. But many alternatives exists -- in particular, agricultural residues.

09:20

Two, we need superefficient, 24-7 production systems. The technology exists, but there's still room for improvement.

09:29

And three, we need to encourage farmers to use biochar so that they can reduce the usage of fertilizers, and improve crop yields. Many companies, as we speak, are developing biochar-based business in a variety of geographies and with a variety of feedstocks. I cofounded one of them. We focus on tropical developing countries. Biomass is superabundant there, in the form of agricultural residues. We used an optimized production model, with easy-to-operate, midsize production plants, where the pyrolysis reactor looks like a tank wagon. Soils in the tropics are generally poor and acidic, hence benefit the most from the addition of biochar.

10:20

And last, energy generation is most needed in rural areas of developing countries, where, very often, less than 25 percent of the people have access to electricity.

10:33

That's how we go back to Mister [unclear]. We will convert to biochar the leftovers from his coffee cherries so that he can use it in his fields to improve the quantity and quality of his production. Mr. Ewané will be able to afford the biochar, given that it will be highly subsidized by the related carbon credits. And the electricity generated will be distributed locally. A very circular model, for climate and people, now.

11:09

Thank you for your attention.