2025 Norman E. Borlaug International Dialogue
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Speakers

- Introduction: Usha Barwale Zehr | Chairperson and Executive Director, Grow Indigo
- Mariangela Hungria | 2025 World Food Prize Laureate and Researcher, Embrapa National Soybean Center
- Marcelo Teixeira | Commodities Reporter, Reuters News

Transcript
Marcelo Teixeira:

Hello, everybody. It's a great honor to be here talking to my, yeah, Brazilian friend and researcher, Dr. Mariangela.

Mariangela Hungria:

Thank you, Marcelo. Well, I don't have to say that I didn't sleep well this night. Okay? Very anxious, so forgive me.

Marcelo Teixeira:

She was telling me she was very nervous. I said, no. That's the easy part now. The hard part you did already.

Mariangela Hungria:

That's the hard part. The easy was to work

Marcelo Teixeira:

And I just would like to to start if you could do a brief introduction of the main areas of your work and why you took that path early in career.

Mariangela Hungria:

Well, I really think that it was something called destiny. Okay? Since I was a child, I wanted to produce food, to try to contribute, not to have hunger. And I wanted to be a microbiologist since I was eight, and my grandma gave me a book about microbiology. Then, of course, although I'm from a family of public educators, not related to agriculture, I went to study agronomy.

But at that time, we have to put time exactly in the right context, okay? At that time, everything was chemicals, chemicals, and it was very important because, mainly because of Dr Norman Borlaug. So this breeding with chemical changed agriculture in Brazil. We were importing food, and by taking that approach, we started to export.

And today, we are great exporters of food. But then, look, I was there at the university, and I really wanted to study biologicals because I knew since the beginning that there should be a place for biologicals in agriculture and in very productive agriculture.

Marcelo Teixeira:

Right. We understand, as they said before here, that your main success is the biological nitrogen fixation in Leguminose plants and which helped to sharply increase production of soybeans in Brazil. Can you tell us a little bit why you focus your work on that specific area at the time and how it evolved to be this success story today?

Mariangela Hungria:

Yes. I was hired by my institution in Brapa. It's equivalent to USDA here in the United States. And I spent about ten years working with the basic microbiology and also with the common beans, Fasellus vulgaris. In this period, I came to U.S.

I did a postdoc here. Returning to Brazil, I was transferred to another unity, to the Embrapa Soybean Center. That changed my life. First, because then I had my own lab, and I could take my own decisions. Okay.

And then I could have many students and so on. So at the soybean center, the first thing I went there to look for farmers and saw that they were not really knowing about the contribution that biological nitrogen fixation could give. So I started, and there was this general thinking that there was no need of adding bacteria every year. Once you introduce the bacteria in the soil, there was no need of applying anything. And I started the experiments and realized because tropical tropics is tropics.

Okay? So in every place, you have to test to see the reality of that place. So then I start to do experiments, and I found out that by applying fresh bacteria every year, the farmer would have more profit, 8% of profit. That was the start of my career with these products because then they started to use the fresh bacteria every year, and then they started me to ask other things.

Marcelo Teixeira:

Yeah. I understand that more than 80% of Brazilian soybean farmers use that type of technique, that solution today, right? How is it possible to spread that to so many farmers coming from a research institute, right, without a proper Well, it's a big institute, but anyway, it's a big task to do.

Mariangela Hungria:

Yes. You know, the thing is that we researchers, we scientists, we have to be linked to to the reality. Like, we always went to the farmer and asked them to solve their problems and how we could help. Okay? Then we went to the lab, to the field stations.

We tried to find solutions. And then, of course, you find a beautiful solution. But this solution cannot be at the lab or or at the field station. Okay? It has to reach the farmers.

So extension activities are extremely important. And I have learned that with biologicals, extension has to be every year. Otherwise, the the farmer forgets. Okay? And then there are chemical people just going there and say no.

No. Change this biological for chemical solution. So we we really put lots of efforts in extension. So this number that's great, 85% of the whole area crop to soybean Brazil uses this nitrogen fixing inoculant every year. So more than 40,000,000 hectares comes from research together with extension.

And also, of course, excellent industrial development because we just go and do extension to the farmers if we are sure that the private sector transformed our scientific solution in a good quality product for the farmer.

Marcelo Teixeira:

That was I was going to ask. You you had a collaboration with the private sector all the way around. Right? And they

Mariangela Hungria:

And also a

Marcelo Teixeira:

strong seeds production and everything.

Mariangela Hungria:

Yeah. And a strong legislation that guarantees to the farmer that what is labeled in the product, he has to deliver to the farmer. Mhmm. Otherwise, they can be even shut down, okay? So we have a legislation that guarantees the quality for the farmer.

Marcelo Teixeira:

Is there an estimate I've heard that that type of solution helped farmers save billions billions of dollars in investments and costs of fertilizers. I don't know if there's any estimate out.

Mariangela Hungria:

Yes. There is. Because, you know, nitrogen fertilizers in general in Brazil are very expensive.

Marcelo Teixeira:

They're more expensive than here, right? Usually.

Mariangela Hungria:

Yes. Yes.

Marcelo Teixeira:

I don't know if

Mariangela Hungria:

Yeah. And usually, look, it's kind of crazy because agriculture is extremely important in Brazil. 25% of our national income comes from agriculture, but we import 85% of all fertilizers that we use. And nitrogen fertilizers, 85%. So we pay in dollar.

So we developed solutions for the soybean. We talk about microorganisms, but look, we are talking about straight interaction plant microorganisms, in this case, a symbiosis. So it's not just the microorganisms. You have to really breed the plants to respond to the microorganisms. We have learned that to have high rate of nitrogen fixation, you have to do soybean breeding in the presence of the bacteria.

Because if you do in the presence of nitrogen fertilizer, the plant will respond to nitrogen fertilizer. So this wonderful situation that we have in Brazil is a result of decades of research of breeding plant and breeding microorganisms. And such that today, we have the highest rate of contribution of the nitrogen biological process for the soybean can fulfill the needs of nitrogen. And if we consider the price of the nitrogen fertilizer in the Brazilian market in the last crop season, the area and the yield that we had, we had a saving of $27,000,000,000. I wish I had 0.01% for my research on that, okay, because this bacteria that we work with are really contributing to the country to save lots of money.

Marcelo Teixeira:

I'm pretty sure they are pretty grateful to the work anyway. And if you can tell us a little bit, there was also Brazilian farmers, usually they plant soybeans and after harvest, they plant corn, right? It's a rotation that most grain farmers in Brazil do. I know you after this first work with soybeans with the rhizobia bacteria, right? You started a new work with corn because responding to some questions from farmers as well, right, that they wanted to to see if there was something that could be done for the corn crops.

Mariangela Hungria:

Yeah. That's fantastic. You know, not to be just close at the lab. And I say that the farmers should be co authors of all of our scientific papers because really they come, they ask, and they give the ideas because the ideas you have when you see the things happening. And we are not at the field all days, all hours as the farm is.

So the farmer were very happy with the soybean biological solutions. And they came to us and said, well, we I do not have just soybean. I also have maize. I have I have wheat. What do you have?

I said, well, I have nothing, but let me try to find a solution. We went through our microbial culture collection, and we found the strains of Azospiridinum braziliense that were fantastic. A combination of two. One gave a little contribution of nitrogen fixation because for non legumes is not never like a legume that's a 100%, but any contribution is very important. And the other one was a very strong phyto hormone producer that increased a lot of roots.

By increasing roots, increase the uptake of water and nutrients. And then we doubled the benefits that we can have in that crop. So we did not know if we developed the first product. We did not know if the farmer was going to accept or not. Today, it's almost in 8,000,000 hectares in a short period of more than of about ten years.

Marcelo Teixeira:

Ten years.

Mariangela Hungria:

Very important. Again, the farmer, the first farm called and said, wow. That was so great that growing the soybean after the maize increased the yield. I said, wow.

Has nothing to do. Then the second, the third, the fourth, I said, I and my colleague, Mark Antonio, we said, well, there's something there. And then we saw that the Azospirillum was also helping the soybean. So we developed then the technology of co inoculation. That's to put the two types of microbial process together.

The rhizobium, that's the industry of biological nitrogen fertilizer and the Azospirillum, that's the industry of biological phytohormones. Then we had more nitrogen fixation, more roots, more uptake of water nutrients, and we doubled the benefits that the farmer was having. Once again, we published papers and the farmers were not there as co authors. Very unfair.

Marcelo Teixeira:

When you started that research, looking at the roots and deeper roots and bigger, it was not yet maybe well, the climate situation was becoming an important issue, but nowadays it's critical, right? Indirectly, I think you did you never imagined that it would be so important to these days. Like Brazil had the last four years was like below average rains almost every year, right?

Mariangela Hungria:

Yes. Well, climate changes are here. We cannot close our eyes for this problem. And I I really believe that microbes can be one of the best solutions. We have, of course, we are working hard on genome planned genome editing.

We are trying several strategies, but microbes can really help on that. Not only on this this root growth, improvement of root growth is strategic, is key because more root, the plant can search for the remaining water in the soil. But we also have now a product, a microbiological product that not only increases roots, but also produce some exopolysaccharides that protect the roots of losing too much water. So another mechanisms of protection. This product is already in 1,000,000 hectares, and there are many microbial solutions that we can search for to mitigate this problem of global climate change.

Marcelo Teixeira:

Right. I know, of course, Brazil is mostly tropical agriculture. U.S. is temporary climate. But there are similarities. I I imagine you exchange a lot of opinions and comments and conversation with people here this week. Right? Is there is there any are there farmers in The U. S, for example, interested in trying out? Or how how is that

Mariangela Hungria:

I think that the biggest similarities are the farmers because farmers are the same everywhere. They want profit. They want to be able to survive with their cropping. And they want novelties, but they want low costs. And today, they are really worried about sustainability.

So, but it's very important to think that we have to find local solutions, Like microorganisms from Brazil that we select there, they are more for the tropics. So research should be performed here for this condition. You have a hard wheat. For example, we had an excellent microorganisms, and I saw wonderful results in Canada. It was a microorganism for phosphate solubilization.

And it was great. It went to Brazil, did not work at all, except for one place that was very cold. Of course, the microorganisms was from Canada. All countries have a huge biodiversity, so they should look into this local biodiversity, the microbial process that they want and try to maximize. So on Monday, had a very interesting meeting, very interesting with association of corn growers here from Iowa.

And I saw that they were very interested in that, especially because now, because of this root growth improvement that we have with some microorganisms, it's the first time that we, from the biologicals, we are very we can be very close to the fertilizers because we have robust data showing that with more roots, we are increasing the efficiency use of the fertilizers. So and the fertilizer industry is is putting lots of money in new formulation, new chemical process to improve because the efficiency is It's very very low.

Marcelo Teixeira:

Right.

Mariangela Hungria:

Okay. Nitrogen usually less than 50%. So now the microbes, we are also friends of the fertilizers because we are helping to improve this.

Marcelo Teixeira:

Yeah, in the absorption. I would like to know what your group, you and your colleagues in Brazil, what are the areas you are working right now? I remember you said something about that during the press conference yesterday. If you could tell us something about the pastures in Brazil as there's a big area for development there.

Mariangela Hungria:

Yes of course, that will never leave the soybean and the maize. Okay? We are the soybean center.

Marcelo Teixeira:

Right.

Mariangela Hungria:

And this speed, the things happen today. Okay? We have to be updated with all the new technologies because maybe a technology that you think that will not affect the bio the biological system affects. So we have to check that every year. But we really want to contribute to the problem that I think that's the most serious environmental problem in Brazil.

We have all the crop in Brazil is about 80,000,000 hectares, and pastures are double of that. And 60% are in some stage of degradation. And we are doing the government is putting now has a program of recovery of degraded pastures. And we have seen that microbes can really help on that. We have results that show that not only the biomass is increased, but also the quality of the biomass. So the cattle will have access to more food and food of better quality. And by improving this pasture, we can release the same area that we have cropped today.

We can double the area that we are cropping without having to cut one tree. So that's our goal today to contribute to that because we do not want and mainly we do not need to cut one tree in Brazil to expand our agriculture because we have we can double the area without having to do this.

Marcelo Teixeira:

Yeah. Unfortunately, we yeah. We know that cattle and soybeans are drivers of deforestation in Brazil, right? It's not it's a small part of farmers that do that, as you said, but it's a problem. So releasing making cattle more efficient, you can release a large part of that area for agricultural cultivation.

Is that right?

Mariangela Hungria:

Yes. But that was a type of expansion of agriculture that we have had in the seventies, eighties. Well, it was not corrected, but it's done. Okay. What can we do?

What we can do is that today we have wonderful technology to recover and not to do mainly to learn about the mistakes that we did in the past. So let's not allow to do the same type of agriculture they did, and let's increase yield because we have tools to increase lots of yield and to recover these degraded areas.

Marcelo Teixeira:

Right. Before we finish our time here, I would like to ask you to give us some comments about what you think about the future of agriculture.

Mariangela Hungria:

Well

Marcelo Teixeira:

I know it's a broad question.

Mariangela Hungria:

Because of the lights, but I really think that the agriculture of the future has will have feminine traits, that women will be extremely important in the future agriculture. Does this does not mean that men will not contribute. But the men, they have to have this feminine traits. Okay? Because I see I I receive many farmers.

Farmers, the main are just, oh, I want to improve. I want to be the winner of grain yield. I want to produce more than my neighbor. It does not matter what I do. I want to be the winner.

It is true. And then the women, they arrive and they say, no. Look, I want to to produce, but I want to produce hours. I want to improve soil health. They want to know about emission of greenhouse gas.

And they say a lot. I want to leave the property for the next generation. I want to do the the right things.

Marcelo Teixeira:

Take better care.

Mariangela Hungria:

Yes. Yes. They care more about the planet and the soil and everything. But this is also important to say. I know that there are many news about Brazilian agriculture that destroys Amazon and so on.

And I can say that we really have some bad guys, but we want to we want to eliminate them. We hope that we'll be able to close their farms out. But the great, great majority of the Brazilian farmers working with soybean, I'm with the biggest one from the smallest one. And I know that they they they are good farmers. Okay?

They they care about they ask about soil health. They they do the soil. They want to do the biological analysis of the soil. They want to know about the biologicals. So let's hope that they become full majority in the very near future.

Marcelo Teixeira:

Alright. And just to conclude, I want you to say something about being the laureate this year. What what it feels like, what it means. I know it was it was not an easy task in the ‘70s in Brazil, being a woman, having a family to raise and do research, the type of the research you did, so

Mariangela Hungria:

Well, no words. Okay? I'm not sleeping. I'm anxious. I'm nervous because I never expected that.

You said to me, well, now you did the hard part, now it's easy part. No. What I did was what I was always supposed to do. It was the easy. The hard part is to be here.

So very honored. And one beautiful thing is that, again, women, many women wrote to me in interviews. They said that it was very important that a woman working on agriculture received this prize. And now a normal woman, okay, that suffered a lot in life, had many problems, and raised kids, and did not have money for research. So if I was able to do it, all women can do. Okay?

Marcelo Teixeira:

Alright. Thank you very much. Yeah. A round of applause for Dr. Mariangela Hungria. Congratulations.

Mariangela Hungria:

Thank you.

Marcelo Teixeira:

Thank you very much.