

Anne Johnson: This is Global Environmental Health Chat; The podcast that explores environmental health issues that transcend national boundaries. I'm your host Anne Johnson and this podcast is produced by the National Institute of Environmental Health Sciences.

You can't get much more global than the issue of climate change. The climate is changing in every country on every continent around the world. But it's not just a physical process effecting temperature and weather. Climate change also has critical biological and ecological impacts. For us humans these changes are expected to pose major economic and public health challenges. One example is the projected impacts of climate change on the crops and livestock we depend on for food.

Joining us to talk about the agricultural impacts of climate change is Dr. Pamela Anderson, who is Director General of the International Potato Center in Lima, Peru. The Potato Center is focused on improving food security for the world's poor. Pamela says climate change represents a major challenge for our ability to meet the world's growing food demands.

Dr. Pamela Anderson: Food experts are predicting that by 2050 we will need 70 to 100% more food in order to feed the planet. We are going to have to almost double food production. That in and of itself is a daunting goal. But in addition, we have to do that within a context of limited land, limited water and intensifying climate change.

Anne Johnson: Climate models suggest that many crops will become much more difficult to grow where they are currently farmed.

Dr. Pamela Anderson: The projections are saying that just because of climate change we could globally lose about 17-20% of our food production and in our major staple crops it may be even more. The loss of rice could be 27-30%. The loss of wheat just due to climate change could be over 40%. The projections that we have done for potatoes, show that in certain parts, particularly of the developing world that are dependent on potatoes, if we do nothing, we could lose, within in 20 years, up to 75% of the potato production.

Anne Johnson: Those predictions are why scientists like Pamela are looking for ways to prepare crops for the changes ahead.

Dr. Pamela Anderson: Over the last 50 years the work on breeding has really focused on increasing the yields. Now we have to worry about other traits, specifically heat tolerance, drought tolerance, sometimes frost tolerance, because what we're seeing obviously is increasing heat, but also more extreme weather events, the droughts, the frosts, the hail. So that we have to look at how do we build into the crops the ability to resist these factors.

Anne Johnson: At the International Potato Center, Pamela's team works with local farmers to develop climate proof crops. One approach is selective breeding, which has allowed them to create potato plants that do well in high heat or that have larger, deeper roots so that they can better handle drought. The scientists and farmers are also experimenting with new farming

techniques. For example they have found that if you water only one side of a potato plants roots you can make the plant think it's getting more water than it actually is.

Dr. Pamela Anderson: You can actually trick the plants so we can maintain the same yield by using half the water.

Anne Johnson: They have even helped resurrect ancient farming techniques. In the high Andes farmers used to plant crops in beds surrounded by water, but over the years the technique fell out of favor. Now, scientists have learned that the technique helps protect crops from frost, something that might come in handy in a future with more weather extremes.

Dr. Pamela Anderson: So now what we're seeing is in some of the frost prone areas, people are taking up again the ancient practices because we now understand the science and what the original intent of that was.

Anne Johnson: Another of the Potato Centers' key goals is to protect biodiversity. Biodiversity is important as we prepare for climate change because you never know what genes or traits might be useful later on. We may already have a great heat resistant potato out there and it would be a shame for it to disappear simply because nobody is farming it anymore. But climate change also makes it harder to preserve highly specialized species. Pamela told me about some native potatoes being grown by farmers in Peru.

Dr. Pamela Anderson: What we're seeing is with climate change and increasing temperatures they are moving their potato production high higher and higher up the mountains to escape the heat. We have nowhere left to go anymore. And the real problem is that some of the diseases are also moving up. So there is a big threat to our biodiversity in the field.

Anne Johnson: To protect these rare crops, the potato center has created the largest in vitro gene bank in the world. It houses 4235 varieties of potato and sweet potato, about 80% of the estimated 5000 varieties cultivated by Pre-Colombian cultures in South America. But despite the value of all this biodiversity, there one thing Pamela says everyone always wants to know: What is the role of genetic modification in this quest for a better potato?

Dr. Pamela Anderson: Any technology which we develop and deploy has potential risks and potential benefits. The only genetic modification that we think is justifiable on a risk benefit basis is looking at developing potatoes that are resistant to potato late blight. Potato late blight is caused by a fungus, it was the disease that caused the Great Irish Famine and it is still the largest biological constraint to potato production around the world. If we were able to produce a potato that was almost immune to late blight it would be an incredible step forward in terms of productivity.

Anne Johnson: But genetic modification is only one tool among many and it's not one the International Potato Center is actively pursuing. Overall, Pamela says if we are going to prepare our farms for climate change we need to take advantage of opportunities in all sectors, from traditional plant breeding, to inventing new farming practices, or resurrecting old ones.

Visit our podcast website for more resources on climate change, agriculture and food security. I want to thank Dr. Pamela Anderson for speaking with us about her work.

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