Cornell University
Graduate School

# Cornell University Three Minute Thesis (3MT) Competition

## Teddy Yesudasan, Plant Breeding and Genetics: "What Makes a Red Potato Red?"

[Clock ticking]

>> Narrator: Cornell University 2019 Three Minute Thesis winner. Teddy Yesudasan, plant breeding and genetics: "What Makes a Red Potato Red?"

>> Yesudasan: Growing up in southern India, all I saw were white potatoes, and so when I came to Ithaca as an international student, and went grocery shopping for the first time at Wegmans, I was shocked to see potatoes that came in different colors. Providentially, I got into a lab that was studying pigmentation, or color in potatoes, and so was equally delighted. We human beings have always been intrigued with color, and scientists have been recently reporting that anything naturally colorful in your diet is beneficial for your health. Now, some of you might be wondering why I have flowers on my slide. Well, these pretty flowers are actually potato flowers, and I will get to it in a minute. And so, 10 years ago, the lab that I'm currently working in discovered the gene that is responsible to make red pigments in potatoes. And when we looked at this gene, we saw that it had multiple alleles. Now, most of you here know what a gene is. Let me tell you what an allele is. An allele really is a different version or a different form of the same gene. For example, take, for instance, eye color. All of us in this auditorium have the same gene for eye color, but the reason that we have different eye colors is due to the different allele, or the different version of the same gene that is expressed in each one of us. Now, going back to my potato alleles, we saw that one allele is able to make red pigments and is labeled as the red allele. And another one, which is not able to make red pigments, is called the non-red allele, and it's labeled so. So when we looked in-depth at the DNA level, we saw that there were certain DNA letter changes at certain positions between these two alleles. And so, using genetic experiments, what we did was, we swapped the DNA letters between these two alleles at the position where they're different, and introduced them into a variety called Prince Hairy. Now, to those of you that are British in the audience, apologies. It's not named after Prince Harry, but it's Prince Hairy because this potato variety has fine hairs on its tubers, and has pale blue flowers. And so, in our experiment, we observed that the color of the flower changed from pale blue to purple. Why? Because pale blue and a little bit of red should give purple, as you see on the slide, and that is exactly what we observed. And so, through our experiments, we have been able to identify two DNA letters that are influential or crucial in converting a white potato into a red, and vice versa. In other words, we've identified two DNA letters that make a red potato red. I'd like to suggest three things that we can do with this data. One is that this information will help us breed better-quality red potato varieties, and two, potatoes are one of the most cheapest crops to grow. Hence, potatoes are an excellent resource for extracting natural dyes. And three, this might seem a little farfetched, but everybody loves potato chips, right? What if we could collaborate with food scientists and make pigmented potato chips that are actually beneficial for our health? This is why I study red potatoes. Thank you.

[Applause]