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**Host:** Welcome to “World of Wonder.” Today my guest is Mr. Ben Ramanna of the International Food Institute. Welcome to the show.

**GM food expert Ben Ramanna:** Glad to be here.

**Host:** So can you explain briefly how a genetically modified plant is different from a non-GM plant?

**Ramanna:** Yes. Genetically modified plants are created by scientists in a laboratory. The scientists change the genes—the genetic information—that controls how the plants grow.

**Host:** Right. And how does that work, exactly?

**Ramanna:** In a lab, we can take a gene from one plant, and put it into the cells of another plant. For example, we can take a gene from a corn plant and put it into the cells of a rice plant. Some quality of that corn plant, a quality that is controlled by that gene, then grows in the rice plant. Maybe, for example, the gene controls the corn’s color. It makes the rice plant grow in a new way.

**Host:** And that can only happen in a lab?

**Ramanna:** Right. There is no way for a corn gene to get into a rice plant except in a laboratory. It could never happen in nature.

**Host:** And I guess that’s why some people worry about GM food.

**Ramanna:** Yes, precisely.

**Host:** They want it labeled in stores. When they buy something, they want to know if it’s a GM food or not.

**Ramanna:** Yes. And right now, labeling differs a lot from country to country. Some countries do not allow GM food to be grown or sold at all. Other countries allow some GM foods to be sold. But they must be clearly marked with a label that says “genetically modified.” And other countries have more relaxed rules. They allow all GM foods and don’t require any labels. So it really depends on where you live.

**Host:** For me, the unknown is what’s scary ...

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**Speaker:** Today, we’re going to talk about the genetic modification of food. That’s genetic modification: g-e-n-e-t-i-c. Genetic modification. Genetic modification is when scientists change the genes inside a living thing, like a plant or animal. These changes make the plant or animal grow in a different way. Another term for this type of food is transgenic food. That’s transgenic: t-r-a-n-s-g-e-n-i-c. Transgenic food. So that’s what we’re going to look at today. Before we go on, though ...

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**Professor Simon Gato:** **E01** All right my friends, today we’re going to continue with our discussion of genetic modification. Now, does everyone remember our definition? Yes? No? We’re not sure. OK, let’s recap. Genetic modification is when we change the genes inside of a living thing to make it grow in a different way, OK? All right. Today, we’re going to talk specifically about genetically modified food—or GM food, for short. Genetic modification has produced many new possibilities in plant biology. Scientists have been able to create all kinds of new plants, and it’s really a very exciting time in this field. But there are some people who are against this practice, and we’ll talk more about that later. **E02** Right now, we’re going to look at three types of genetic modification: first, modifications to make food stay fresh longer; second, modifications to make crops grow better; and third, modifications to make food healthier.

**(COACHING TIP 1) E03** Our first example is about a modification made to help food retain freshness longer. It was called the FlavrSavr Tomato. That’s spelled F-l-a-v-r-S-a-v-r, FlavrSavr. And like the name says, it was supposed to save the flavor of a fresh tomato. Now it’s interesting actually because it was the first genetically modified food to be sold in US supermarkets, back in 1994. **E04** So, why was this tomato created? Well, there’s a big problem with growing fruits and vegetables, and that’s keeping them fresh. Like tomatoes: After you pick them, they go bad quickly. They get too soft, they don’t taste good anymore. Now, the reason the tomato goes bad is because of a special chemical inside the tomato plant. This chemical starts to work after a tomato is picked, starts making it get soft. **E05** Scientists wanted to stop this chemical from working. To do this, they created the FlavrSavr Tomato by adding a gene called antisense RNA. That’s a-n-t-i-s-e-n-s-e. Antisense. This antisense RNA gene stops the chemical that makes tomatoes get soft. The chemical doesn’t function, so the tomato stays fresh for a long time, much longer than a normal tomato. **(COACHING TIP 2) E06** But there were some problems with the FlavrSavr Tomato. One problem was that people didn’t trust this new genetically modified food. They thought it might be unhealthy or even dangerous to eat, so they didn’t buy it. Another problem was that, well, people said it just didn’t taste very good. At any rate, shoppers didn’t purchase the FlavrSavr, so it wasn’t grown anymore after 1997. **E07** Our next example is a plant that was developed to grow more easily, a type of corn called Bt Corn. That’s B-t Corn. Now, all farmers have problems with insects eating their crops. And corn farmers have problems with

an insect called a rootworm. This worm gets inside the corn plant and it eats it. And these worms can kill an entire corn crop. For a long time, the only method for getting rid of these insects was the use of pesticides. But, as you know, pesticides cause problems, too, because, while they do kill pests, they also can be dangerous to people and the environment. And they're very expensive to use. So it isn't the best solution to the problem. **(COACHING TIP 3)** And this is why Bt Corn was developed. **E08** To make Bt Corn, scientists used a common bacteria called the Bt bacteria. This bacteria lives in the ground and makes a natural poison that kills insects. But it doesn't hurt people at all. So scientists added the Bt gene to corn plants, and now when insects consume the plant, they die, but people and animals aren't hurt at all. Now for farmers, Bt Corn is one of the most popular genetically modified crops today. It's grown all over the world, although the corn is used primarily as food for animals. **E09** Finally, let's look at a food that's been created to solve a health problem. Millions of people around the world—the poorest people. They don't get enough food with vitamin A—you know, the, the vitamin in orange foods like carrots and sweet potatoes. And this causes serious health problems: Over a million children die each year from a lack of vitamin A, and another 300,000 go blind. So scientists thought if they could add vitamin A to rice, it would help millions of people eat better and live healthier lives. They came up with a new kind of rice with extra vitamin A in it. It's called Golden Rice. **E10** To make Golden Rice, scientists took a vitamin A gene from a plant—a daffodil, which is a flower—and added this gene to the rice plant. Looking at the rice, it looks just like regular rice, except it has a kind of a yellowish-orange, golden color—like a carrot. That's the vitamin A gene giving it that orange color. At this point, Golden Rice is still being studied to make sure it's safe. So it's being grown in a few places, as a part of these studies, but we'll have to see if it becomes a common source of vitamin A in the future. **E11** So that gives you some ideas of the three main reasons why genetically modified plants have been developed. **(COACHING TIP 4)** Next time we're going to look at exactly how this works in more detail.

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- 2 Scientists have been able to create all kinds of new plants, and it's really a very exciting time in this field.
- 3 Now it's interesting actually because it was the first genetically modified food to be sold in US supermarkets, back in 1994.
- 4 This antisense RNA gene stops the chemical that makes tomatoes get soft.

- 5 And corn farmers have problems with an insect called a rootworm.
- 6 For a long time, the only method for getting rid of these insects was the use of pesticides.
- 7 Now for farmers, Bt Corn is one of the most popular genetically modified crops today.
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**May:** I don't know about everyone else, but I personally don't trust genetically modified foods.

**Michael:** I agree. I don't trust them either. I mean, me, I won't buy GM foods. In fact, there are a lot of governments that won't even let these foods come into their countries.

**Qiang:** Hmm, that's a strong reaction, in my opinion. Don't you think? I mean, look at Bt Corn—it takes away the need for pesticides. Isn't that a good thing?

**May:** It's so unnatural, and it would never happen in nature. What, a gene's suddenly in a corn plant and it poisons insects? Come on. It's really strange.

**Michael:** Yeah, and besides, big business is behind all of these products. I mean, they just want to make a lot of money off of all of this.

**May:** Uh-huh. Exactly!

**Qiang:** Actually, I don't disagree with you on that point. I mean, food is a big business, and of course the food companies are trying to make their money on it. Right?

**Yhinny:** Overall, I agree with Qiang. I can't understand why people have such big fears about GM foods. If we can produce healthier foods, why not do it?

**Michael:** OK. Maybe we should just "agree to disagree" on this one?

**Qiang:** Sure.

**May:** No problem.

**Yhinny:** Fine! Agreed!

**Qiang:** Let's talk about something else.

**Michael:** Thank you!

**May:** Let's get back to our notes.