Podcast interview: Roger Beachy

I’m Prashant Nair and welcome back to Science Sessions.

PN: Plant biotechnologist Roger Beachy, a member of the National Academy of Sciences and former director of the USDA’s National Institute of Food and Agriculture, has championed genetically modified crops for decades. In the late 1980s Beachy helped launch the agricultural biotechnology industry with his work on virus-resistant tomato plants. Today, transgenic plants have become a mainstay of US agriculture with genetically engineered soybean, cotton, and corn, among other crops, contributing to sustainable food production. To meet the nutritional demands of a growing global population Beachy says conventional plant breeding practices must be supplemented with biotechnology. But longstanding concerns over the safety of genetically modified crops have often led to skepticism against the industry. Beachy holds that agricultural biotechnology can combine sustainability, economic viability, and environmental safety. I recently spoke with Beachy about the role of plant biotechnology in agriculture.

RB: The growing population around the world will mean that we have to have agriculture that is more productive and we’ll be concerned not only about the amount of calories but the quality of those calories. So, we have to find ways to increase agriculture productivity in those parts of the globe where there’s poor productivity, and to create crops or develop crops that have increased nutrient value. There are a lot of challenges that farmers meet. They need more water or less water, they need to have the ability to use nitrogen more efficiently, and they need higher yielding seeds and those seeds must be free of pathogens and pests.

RB: And standard agricultural practices, crop breeding and advanced plant breeding, will answer many of those questions. Organic fertilizers or chemical fertilizers will answer other questions. Biotechnology will be brought to bear when other solutions can’t be imposed.

PN: But can plant biotechnology help address food shortage issues that are exacerbated by changing environmental conditions?

RB: Climate change is bringing about unusual weather patterns in our agriculture in the US and certainly around the globe—more frequent droughts, more frequent floods, or periods of time when wind erosion is far greater than it has been in the past. And there are many examples of crops that don’t have the traits that we need in the changing climate that we are facing. The root and tuber crops are susceptible to certain diseases and we’ll need to learn how to fight those diseases. And if that requires a biotechnology innovation, a genetic engineering innovation, finding solutions to those problems will of the utmost importance. Biotechnology will be an important component of that and the science that’s leading to the solutions is developing very, very rapidly.
**PN:** Yet it’s the rapid pace of the scientific advances behind new varieties of food crops that have led to concerns over their approval by regulatory agencies and their acceptance by consumers.

**RB:** How will we approve those new varieties and how will the consumer accept them. Those are two different subsets of an answer. The first one is partially policy in some countries. In our country we like to say that we make decisions based on science and if the science stands up then the product is ready to move out. If however, the consumer is concerned about one kind of breeding technology, such as genetic engineering, then there’s a sociological issue that needs to be addressed. We need to keep the consumer, the buyer aware of why we’re making the changes, what the advantages are, and lay those out in way that the consumer can see the advantage, or the challenge, of a certain technology. We do this in other fields, and I think that doing it in the case of food is a little more challenging because we associate ourselves with our diets and what we like to eat and how it’s grown.

**PN:** I asked Beachy whether the role of the public sector in producing transgenic crops has evolved in the recent past.

**RB:** When the technology of genetic engineering was first used in agriculture, there was a great excitement in the public sector because they looked at the nutritional value, environmental value, and productivity value and many of us began to explore the use of transgenic technology. And we were very excited about the possibility of contributing that knowledge to benefit agriculture. As it became more and more formalized, it became clear to all of us that there is a process that needs to be put in place to ensure that the products that were developed were safe.

**RB:** As The Food and Drug Administration, The USDA, and The Environmental Protection Agency formulated policies for regulating transgenic crops, it became more and more complex. And as it becomes more and more complex, getting a product through the process requires more and more money. But that then leaves the company to make a decision about what is profitable and they will of course choose those technologies which lead to more profits, and that largely leaves university scientists out. I think a way to address that might be a federal role to teach scientists and universities how to commercialize, and make it easier for them to do it, and to adapt the regulatory structures based upon the safety of biotechnology crops and how that would be used by academic scientists.