

The Man Who Tried to Feed the World

Published 13 April 2020, with Rob Rapley.

Almost four years ago, I introduced an episode with the idea that if you listening had to name a plant breeder, the name you'd probably come up with would be Norman Borlaug. That's because Borlaug is known, if he's known at all as the Father of the Green Revolution.

He created the modern high yielding strains of wheat and so put an end to global famine. People say that Borlaug's work saved billions from starvation. In 1970 he won the Nobel Peace Prize, and the authorized biography of Borlaug is called *The Man Who Fed the World*.

Next week, PBS in the United States will screen a show called *The Man Who Tried to Feed the World*. That title suggests that maybe there's more to the story -- and there is. I had a chance to see the film and to talk with Rob Rapley, writer, producer, and director about the film and about Norman Borlaug and his work. Why make a film about Norman Borlaug?

Rob Rapley: I have specialized to some extent in stories with a scientific angle. And so we're always looking for stories with a scientific angle that have a compelling main character. And we came across Charles Mann's book *The Wizard and the Prophet* that kind of led us down this path. It's such a huge, huge story and not very well known, and he's a very compelling character, like him or not.

Jeremy: And, and how long has the film been in the making then?

Rob Rapley: It was probably about 18 months from conception to delivery.

Jeremy: You got some fantastic archive footage stuff. I thought I'd seen it all. But you've got some wonderful archive footage. How did you do that?

Rob Rapley: Well that I have to give credit, there's an archival producer who really does that, and that's a job of its own.

If you dig deep into the archives ... A lot of people, if you work fairly quickly, you tend to come across the same stuff. And if, when you dig, dig deeply, there's always more. There's this stuff that hasn't been

transferred, that nobody's bothered to transfer from film to video, and if you can bother to do that, there's always more stuff out there.

Jeremy: It's interesting because one of the crucial archival moments is when you show the very first tractors and how the tractors kind of freed the young Norman Borlaug from all the work he had to do on the family farm. I think you kind of make the point, that maybe that's where he got his fixation, that technology can fix everything.

Rob Rapley: I think that's absolutely right. It was such a pivotal experience in his development to go from really farming in a way that would have been familiar to the ancient Romans, with all the labor that that implied, that children were working from a very young age, very, very hard. And then, in the space of one season, getting a tractor. And it not only reduced the amount of labor, but increased their income because you didn't have to dedicate a chunk of the farm to forage. And so all of a sudden you could grow a cash crop on that farm as opposed to a subsistence crop. So for the first time, not only was the labor not the dominant thing in your life, but you had a little bit of free time and a little bit of, you know ...

His grandfather showed up with a radio one day. And so it just broadened his horizons as well. And I think that, as you say, really planted the seed in his mind that this is the future, and this is salvation.

Jeremy: This is an impossible task because you've made a one-hour long film: is it possible to tell Norman Borlaug's story briefly?

Rob Rapley: Well, yes. Just not very well.

He grew up on a farm in Iowa in the early part of the 20th century in incredible isolation. And then, as we discussed, their lives changed with the introduction of technology, from being really a subsistence farm to having a little bit of cash and leisure. And he, as a result, manages to go to school after the seventh grade, about past elementary education. He went to school in Minneapolis and ended up studying biochemistry. And he kind of happens into this project that is being promoted by the Ford Foundation to improve agriculture in Mexico.

So he dedicated himself to this task and the specific task of defeating stem rust, a disease that was wiping out wheat crops in Mexico and around the world and had been for thousands of years. And in the

space of a few years through just insane, hard work and some innovative approaches, he managed to defeat this disease that had been decimating wheat crops around the world for thousands of years.

By this time, the geopolitical situation had changed and Mexico's stability was no longer the predominant concern of the American government. Communism was. And so his work gets applied to a very different purpose, which is to feed the world and thereby stave off the spread of communism.

And it is adopted in equal parts by governments around the world who are looking for food for their own people, but also a measure of independence. In the same way that if you are not struggling to feed your people, you can afford to do other things—including become more independent from the United States.

The government of India, for example, was looking to solve its very, very chronic food problems. And Borlaug becomes involved in a program there to implement the technology that he developed in Mexico. This kind of spreads around the world very, very quickly. So in the space of a few years, you go from a situation where the world was confronting widespread famine, and in the space of a few years, through this technology, that problem was basically alleviated.

And he, as a result, was awarded the Nobel Peace Prize.

Jeremy: But how did they know to recruit Borlaug for this job down in Mexico, because he hadn't really made a name for himself at that point.

Rob Rapley: Not at all. He happened to have studied at the University of Minnesota with one of the main architects of that program. He was, you know, not the top candidate in the country or anything. He was enlisted as the low guy on the staff.

Jeremy: But he took to it. I mean, he went down to Mexico and he really applied himself to it. And the goal was stem rust.

Rob Rapley: The goal was stem rust. And it was odd because stem rust afflicts wheat specifically, not other crops. And ...

Jeremy: Yeah, you think of Mexico, you think of maize.

Rob Rapley: Exactly that. Wheat was not the dominant crop in Mexico. It was only about a 10th of the country's crop, and so they thought it was a little odd, but it was actually the Mexican government had demanded that they include this in their program. Three of the four people were working on maize, as you suggest.

The Mexican government ... It's a combination of things, but there's the usual kind of self-interest, that the ex-president of Mexico had developed a whole irrigation system in the North of the country — where his farm happened to be — and the crop up there was wheat, so it was very much wrapped up in politics.

Borlaug himself, honestly, his great virtue was his intense, laser like focus, which enabled him, once he had his teeth into this, to work incredibly hard. But the downside of that is that you don't look right or left. And he never really thought about the political implications or anything else. He had his task and that's what he was doing. And that would play out over the years.

Jeremy: Part of the laser like focus is that, where a normal plant breeder would be looking forward to the winter and sorting things out, he developed this idea of shuttle breeding where you get two generations in one year.

How did that work?

Rob Rapley: That's right. So for centuries, plant breeders had believed that you had to develop a plant for the environment where you expect it to grow. And so you were of course limited to the seasons that applied there. Borlaug, to some extent because he hadn't been trained in the breeding of wheat, he decided to ignore this conventional wisdom and decided to grow a crop in one place, take the winners, the very small number of plants that had really survived stem rust and survived everything else and thrived in those conditions, take them to another place, from basically central Mexico to Northern Mexico, and very, very different environments, and then grow them there during the winter.

So you would get in effect two crops a year instead of the one that you would normally get. As a result, he was able to speed up the development time by a factor of two

Jeremy: And his boss was dead against this. Was it just because it wasn't the received wisdom.

Rob Rapley: That was part of it. But the main thing is that his boss had a much wider worldview than Norman Borlaug.

His boss was really dedicated to helping the Mexican peasants who were clustered around in the region around Mexico City and who were growing corn on very small subsistence farms. So this stem rust program was not applicable to them at all, partly because they were growing corn, but also because in order to produce the large yields that the tremendous success of Borlaug was achieving, you needed to use a lot of fertilizer, chemical fertilizer, and water, both of which were rare and expensive, and in Mexico these peasant farmers didn't have access to it.

So his boss was focused on the benefit of these small peasant farmers, and he felt that Borlaug was really going off on another track and losing sight of the focus and the big goal,

Jeremy: But he did come around in the end, I think, didn't he?

Rob Rapley: His boss came around to some ex ... Well, he did come around. He had no choice.

His boss's boss was the top bosses at the Ford Foundation and the State Department, which was now getting interested in this program, very, very excited about that program. And they saw global applications far beyond the peasant farmers around Mexico City. And so Borlaug's boss was moving up the chain at the Ford Foundation. So it was either, like the program, or find another job.

Jeremy: In the first instance, what was it that took Borlaug to India

Rob Rapley: By the early sixties Borlaug had tremendous success with his program. He really had developed wheat that would yield huge, huge, 10 times the amount of grain that traditional wheat had. And it also resisted stem rust, which was a problem in wheat in India as well as everywhere else. Those seeds had been sent around the world as part of a UN program to kind of develop agriculture around the world and combat famine and so on. And the scientist in India Swaminathan had found these and was developing them and he invited Borlaug to come over to India to help develop this and to help promote it.

Jeremy: This is a point in the film where I got very confused, because India had famines, and to begin with, although Swaminathan

was keen on it, the rest of India didn't seem that keen on it, maybe because they were getting food aid from the United States. And then, just when there was a big drought in India, Lyndon Johnson, LBJ, cut off the food aid. And so now the Indians were quite keen on becoming more self sufficient.

I couldn't, in my head — I know it's a complex story — but I couldn't work out what drove what. In other words, why did LBJ cutoff food aid to India?

Rob Rapley: There were several factors that went into that decision.

The food aid to India program had begun under Eisenhower in the mid fifties as a relatively small and crisis driven thing. It wasn't supposed to be really a perpetual program as India's situation worsened over the years. That food aid, it obviously served American interests because it made the Indians more dependent on the United States. But that food aid program expanded so that by the early 1960s, they projected that the food aid to India was going to take half of the American wheat crop. It was not a sustainable situation. So the Americans become more and more genuinely interested in promoting agriculture in India, because they can't sustain this aid program.

Lyndon Johnson's Lyndon Johnson, so there were other factors that went into it.

In the summer of 66, I'm pretty sure that's right, Indira Gandhi, the new Indian prime minister, on a trip to Moscow criticized the war in Vietnam and Johnson, and even more members of Congress, were appalled that a government that they felt owed them its existence was cozying up to the enemy and criticizing American policy. That was a factor as well. It wasn't the whole story that. The basic motivation was just this wasn't sustainable. But of course, you know, Lyndon Johnson is not a simple guy and never had simple motives.

Jeremy: So the idea that the green revolution was fighting the red revolution, that's real? That's not just a coincidence?

Rob Rapley: Absolutely not. That was baked in, so to speak, from the beginning. It was not conceived as part of the war against communism because it was conceived before the war against

communism, in the early forties. But as soon as they realized its potential, it very much became part of that plan.

The Ford Foundation, which had conceived and funded the plan, was working hand in glove with the State Department by the late fifties and early sixties. They were wholehearted soldiers in the cold war. There was really no distinction between State Department goals and Ford Foundation goals. And the overriding goal of the State Department was the cold war.

Jeremy: And then of course came the Nobel peace prize very quickly. 71?

Rob Rapley: 70, yeah.

Jeremy: 70.

Rob Rapley: Yeah.

Jeremy: Looking back, and with all the research you've had to do, was it justified?

Rob Rapley: Yeah.

It's more justified than say, Henry Kissinger's, you know. You gotta put it on a scale. Or for that matter, Barack Obama's. Much as I love Obama. I don't know what he did to get that Peace Prize.

It's hard to put ourselves back in that time. The population bomb, as it was then termed, and the looming global famine really was almost felt in the same way that global warming is now. So if somebody came along this year and solved global warming, you can bet that in two years they'd be lionized around the world. And that's what it felt like.

Then, looking back, we can see two things. One, that the crisis was exaggerated. The population bomb was taken up by journalists and writers who really made hay of it and took a genuine problem in parts of the world, in India, in China, and projected it onto the world and just exaggerated. There was a genuine problem, but it just was nothing like as pressing as global warming is now. And the other thing is that they couldn't see at that time how it was going to unfold.

Looking back, we can see all of the negative effects that this has had over time. They just saw that, Oh, wow, you know, this huge crisis

that was going to kill us all, is now gone. And, and so it's not surprising that he got it.

I don't think it reflects political calculation in the same way that say Henry Kissinger's does, but looking back, I don't know if the longterm effects of the green revolution would be hailed in the same way than it was then.

Jeremy: Yeah, because although India is now a net exporter of food, it still has massive problems of malnutrition. It still has one of the highest child stunting percentages in the world. So it's not clear cut.

Rob Rapley: It's not at all clear cut. And this is where the story gets complicated. As you say, India has become an exporter of food. Borlaug always conceived of this program as a war against hunger, but its implementation was up to the client governments and in the end, the American government and the big actors and the multinational companies that had huge stakes in it. So it's chief effect in many places has not been to lessen hunger, but to strengthen governments, and this is definitely the case in India.

In the mid-sixties, India was a financial basket case. It was entirely dependent on the American government, as could be illustrated with Johnson's blackmailing, and that is no longer the case.

The fact that India is exporting food suggests that the problem there is not so much lack of food as it is the priorities of the Indian government. It's distribution, and poverty, and so on. That's a big question that goes far beyond Norman Borlaug. Borlaug played a large role in the conception of this program but almost immediately he was kind of shunted aside by much bigger players.

Jeremy: He started off wanting to benefit the the poorer farmers, and in the end, maybe he didn't benefit them as much as he originally set out to do. It's ironic though that it was mostly the campesinos from central Mexico who went north into the United States to find work when farming was just no longer enough to support their families.

Rob Rapley: That's right. The longterm effects of this in Mexico are ... You can't ascribe anything to a single cause, industrialization. There's so many things that go into a migration on that scale. You

know, this goes back to what was the motivation, the goal of the program?

The original goal was supposed to be helping the campesinos in Central Mexico. Borlaug took a different target. He said, this is about fighting hunger, not about helping small scale farmers who are inefficient. What's efficient is big, large scale farms with industrial processes, that's how you're going to feed. That's how you're going to fight hunger, not with little small scale farmers. And that was of course the basic fight in the very beginning, between him and his boss.

So in a sense, you could say he did fight hunger. Or he certainly helped increase the production of food, but he did not help small scale farmers. Small scale farmers were left behind in exactly the way that his boss had predicted they would be.

Jeremy: And they foresaw, back then in the forties, they foresaw urbanization being the end product of all that.

I actually saw Borlaug once at a meeting —when was it? 2005, I think — and he gave a tremendous defense of technology and specifically genetically engineered organisms. You didn't touch that in the film. Too tricky?

Rob Rapley: It's not just that. It's that he didn't play a significant role in that. He advocated all sorts of things, including DDT long after ... His faith in technology and science was just never, never affected by anything that happened in the real world.

And I think it illustrates the basic problem of the program and the underlying theme of the film. It illustrates the danger of scientists using scientific solutions to solve real world problems, because it's the nature of scientific inquiry that you need to abstract a problem from its real world context, and you analyze it, and you find a solution to that problem in the abstract. Then you reintroduce that solution into the real world, and that's where you get all these unintended consequences.

Borlaug never acknowledged in any meaningful way the unintended consequences of his program. And he kind of lived a life in isolation in a way, first in Iowa and then the fields in Mexico. And so he never really engaged with the real world in the way that some other people did. And I think that goes a long way to explaining the negative

ramifications of the green revolution. I think it offers a warning for our approaches to global warming.

Science will play a role in that solution, I presume —praying that there is a solution —but we shouldn't rely on a scientific solution because there are always unintended consequences.

Jeremy: I think the most telling moment of the film for me, and this goes back to what you were saying about the population bomb, was towards the end. You point out that Borlaug only ever said we were buying time. I think you say in the film 25 to 30 years was what he thought. It's been 50 or 60 but I don't know. I think looking back, I think we've squandered the time that Borlaug and others bought us in trying to find an equitable, sustainable solution to feeding the people of the world. And I just wondered what your take on that was.

Rob Rapley: I agree 100%. I guess there are two things. One is that Borlaug said, this program has bought us 30 or 40 years. It became his mantra, that. It's what he said when he accepted his Nobel prize and he said it a hundred times afterwards, that I bought us 30 or 40 years to deal with what he called the population monster. The population monster is not so easily dealt with. And efforts to deal with the population monster in China, India and elsewhere, have led to huge human rights abuses. And generally the population monster is someone else's baby, not yours.

But I think you're absolutely right, that once we had an easy solution and a very, very profitable solution for some people, and a very potent tool for governments to make money, as many are. And, as you pointed out, countries are exporting food while their own people are starving.

The search for the solution to a very complex problem of how to feed people without destroying our resources and feeding more carbon into the atmosphere and so on, that's a difficult problem that didn't serve those interests.

I think if everybody was being altruistic and farsighted, we would have engaged with this far before now and we would be living in a better world. But it is the nature of the world that something that feeds money and power is going to get pretty deeply entrenched, and certainly the Green Revolution is deeply entrenched.

p.s. I went back to the Nobel lecture Borlaug gave in December, 1970, when he had this to say:

“The green revolution has won a temporary success in man's war against hunger and deprivation. It has given man a breathing space. If fully implemented, the revolution can provide sufficient food for sustenance during the next three decades, but the frightening power of human reproduction must also be curbed. Otherwise, the success of the green revolution will be ephemeral only.”

The problem is with that word curbed. When sensible people have enough to eat, when their children survive and thrive, when they're free to control their reproduction, that's exactly what they do without needing to be curbed.

Borlaug gave us three decades. Five decades ago. I wonder what the next three decades will bring.