
DR. NORMAN E. BORLAUG: 20TH
CENTURY LESSONS FOR THE 21ST
CENTURY WORLD
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Norman Borlaug's approach to increasing global food production resulted in the saving of as many as one billion people worldwide from famine, starvation, and death and earned him the title "Father of the Green Revolution."

Indeed, writing in *The Atlantic Monthly* in 1997, Gregg Easterbrook wrote that "Norman Borlaug has already saved more lives than anyone who has ever lived."

Over the past three years, it has been my privilege to work directly with Dr. Norman Borlaug—comparing notes on our experiences in rural development, planning World Food Prize International Symposia, selecting young students for International Internships and accompanying him to the 100th Anniversary of the Nobel Prize in Oslo. In the course of doing this, I have spent many fascinating hours talking to him about his life and career. It is a great story.

THE FORMATIVE YEARS

Named by *Time Magazine* as one of the 100 most influential minds of the twentieth century, Norman Borlaug is a quintessential American success story. Norm, as he is known to all who work with him, was born in 1914 to Norwegian-American parents outside Cresco in the northeastern part of the American state of Iowa. His boyhood was spent on a Norman Rockwell-esque farm, where he had indelibly etched on his psyche the value of hard work, first inculcated by his family and later by his teachers and mentors.

His formal education began in a one-room schoolhouse. It was there that a young Norm Borlaug first learned the lesson that confronting the harsh realities of prairie farm life could bring disparate people together

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and impel them to cooperate. Immigrant children from Norway and Bohemia discovered in that small Iowa school that they had much in common, just as their parents found that working together to ensure sufficient food for all was more important than any ethnic or linguistic differences that might initially divide them. It was an insight that would remain with Borlaug throughout his life and would come to permeate his work.

Norm developed a dogged tenacity—another quality that would play a crucial role in some of his greatest achievements—from participating in his high school wrestling program. His coach, Dave Bartelma, taught him never to give up, no matter how formidable his adversary. This attitude propelled Borlaug to the top of the intercollegiate wrestling world and would later earn him induction in the NCAA Wrestling Hall of Fame.

Still another lesson Norm Borlaug absorbed was the critical importance of rural roads to spreading the word about the latest agricultural innovation and helping farmers get crops to market. Iowa was dramatically affected by the Great Depression, with foreclosures on family farms bringing displaced families close to insurrection. The network of farm-to-market roads being built all over the state not only facilitated agricultural production, but also the transport of children to school and access to medical care. The roads uplifted an entire generation of rural Iowans in a way almost nothing else could. Life improved and the specter of political unrest receded.

All these factors came together in a way that steered Norman Borlaug to seek a university education, the first person in his family to do so. This was a particularly arduous undertaking in the heart of the Great Depression. I recall that as we drove through Oslo in December 2001 during the Nobel Anniversary, Norm recounted to me how, after graduating from high school, he labored for 50 cents a day as a hired farmhand to save enough to pay for a year of college. Eventually Norm had enough money to make his way to the University of Minnesota where he would major in agricultural science, become an accomplished wrestler, meet his wife Margaret, and earn a Ph.D. in Plant Pathology.

IN TOUCH WITH THE ENVIRONMENT

To help pay his way through college, Borlaug worked in a coffee shop, served meals in a sorority house, and parked cars. In the summer, thanks to his major in forestry, he obtained a job as a U.S. forest ranger along

the Salmon River in a remote part of the western state of Idaho. He came to embrace the solitude of the forest and cared deeply about the plants and wildlife that was sustained in this habitat. His expectation was that upon graduation, he would become a full-time employee of the Forest Service.

However, fate intervened to redirect his life and to impact human history. As Norm tells the story, just a few weeks before graduation, he received a letter from his supervisor in the U.S. Forest Service informing him that a tight budget situation meant that he could not start his new full-time forest ranger position for another six months. A disappointed Borlaug agreed to delay his arrival and decided to take some additional courses on the Minnesota campus. One day, he saw a notice on a bulletin board for a lecture by Dr. Elvin Stakman, the head of the university's plant pathology department. Borlaug decided to attend.

Norm was riveted by Stakman's lecture on rust, the parasitic fungus that attacked a wide variety of plants and trees. As Lennard Bickel wrote in his biography of Borlaug, "that night . . . Stakman was a magnetic and compelling teacher. His style, his sincerity, the intensity of his delivery made his words ring in Borlaug's ears."

Stakman ended his discourse with a moving charge that it was science which would ". . . go further than has ever been possible to eradicate the miseries of hunger and starvation from this earth." Norman Borlaug was hooked. He went to see Stakman to ask to be admitted to the Ph.D. program in plant pathology and gave up the possibility of a career in the Forest Service. It was a decision that would change his life, and save one billion people.

CONFRONTING POVERTY—MEXICO

Graduating in the middle of World War II, Dr. Borlaug went to work for the DuPont Corporation. But he was soon approached about joining a fledgling research project being initiated by the Rockefeller Foundation in rural Mexico. There, he first saw the plight of poverty-stricken wheat farmers barely able to sustain themselves due to repeatedly poor harvests. Once again, Borlaug found a wide chasm to be bridged. There was an instinctive hesitation to adopt untried new technologies on the part of most subsistence farmers. And, there was an understandable reluctance to trust the word of an expatriate American college boy who didn't even speak their language.

Borlaug admits to being extremely discouraged in this initial venture into the developing world. But his commitment to learn the language, a healthy dose of the determination he learned in high school sports, and his willingness to get his hands dirty working in the fields eventually enabled him to connect with some farmers who tried his new approach to wheat production. As Professor R. Douglas Hurt observed:

In 1944, when Borlaug arrived in Mexico, its farmers raised less than half of the wheat necessary to meet the demands of the population. Rust perennially ruined or diminished the harvest . . . Borlaug labored for 13 years before he and his team of agricultural scientists developed a disease resistant wheat. (But) still problems remained.”

While the new wheat variety he had developed increased yields and resisted rust, it did not have stems strong enough to hold the now heavy heads of grain. Plants would topple over in the wind and rain. Dr. Borlaug then turned to Japanese dwarf strains which he crossbred with the varieties being raised in the hot, dry climate of northern Mexico. Then, using what a *Wall Street Journal* article called “shuttle breeding,” Borlaug and his team would rush the plants to southern Mexico where it was possible to carry out two growing seasons in one year.

The results were as astonishing as they had been difficult to attain.

Aided by the use of fertilizer and irrigation, Borlaug’s new spring wheat enabled Mexico to achieve self-sufficiency in 1956. His belief in scientific research and a hands-on connection to the farmers paid off in what was considered an agricultural miracle.

THE GREEN REVOLUTION, FROM CIMMYT TO SOUTH ASIA

Inspired by his breakthrough achievements, the U.N. Food and Agriculture Organization and the Rockefeller Foundation asked Borlaug to turn his attention to the Middle East and South Asia. The problem of extreme poverty and failing harvests afflicted not only Mexico, but also much of the developing world, and was exacerbated by the post-war population explosion. As Indian agribusiness pioneer and World Food Prize Laureate Dr. B. R. Barwale noted, in the immediate aftermath of World War II, famine and the prospect of mass starvation haunted the

Indian subcontinent and other parts of the globe. The great Bangladesh famine in the late 1940s seemed an ominous harbinger of pandemic starvation, which would extract a devastating toll, adding to the more than 160 million people worldwide who had already died of famine or starvation during the previous 100 years.

But much of the developing world was pulled back from the precipice of enormous human tragedy by the scientific pioneers who promulgated the Green Revolution. Leading them was Dr. Norman Borlaug and the young agricultural scientists he had trained at the Centro Internacional de Mejoramiento de Maiz y Trigo—the International Maize and Wheat Improvement Center (CIMMYT) located outside Mexico City. Having overcome great resistance by farmers in Mexico, Borlaug and his compatriots faced the seemingly impossible task of convincing the leaders of both India and Pakistan—two countries bitterly divided—to embrace an entirely new approach to agriculture. Borlaug recalled that going in to speak to these two most powerful political leaders required summoning the same amount of courage as when he stepped on the wrestling mat. But he went forward and presented the options available. Borlaug’s breakthrough technology arrived just in time to prevent a human catastrophe. By increasing crop yields in Pakistan and India fourfold, those traditionally food deficit countries became self-sufficient in an amazingly short time, saving hundreds of millions of lives.

Borlaug’s achievements in wheat spread throughout the Middle East and North Africa with similar lifesaving results. Beginning in the early 1960s, his approach to wheat breeding was introduced in Egypt, Tunisia, Syria, Iran, Libya, Jordan, Lebanon, Turkey, Iraq, Afghanistan, Algeria, and Saudi Arabia, in many cases, through young scientists who had studied with him at CIMMYT. Just how significant an impact he had was brought home to me four decades later, while I was visiting with the Egyptian Minister of Agriculture in Cairo. When I mentioned Norman Borlaug’s name, the Minister immediately stopped the meeting and sent several aides rushing from the room. They returned a few minutes later with displays of robust wheat plants which the Minister proudly showed me. “We know Norman Borlaug very well,” the Minister declared, going on to point out how Borlaug’s innovations had helped transform agriculture in his country and throughout the region, to the benefit of millions upon millions of the citizens of all these countries.

THE IMPACT IN ASIA

Borlaug's successes in wheat were quickly replicated in other grains, most notably rice, by scientists such as M. S. Swaminathan in India, and Robert Chandler, Henry "Hank" Beachell, and Gurdev Khush at the International Rice Research Institute in the Philippines. Together, with countless others, they helped avert famine and starvation in much of the developing world in the second half of the 20th century.

I was a young development worker in the Mekong Delta in 1968 when the new "miracle rice" from the Philippines arrived. Its impact in the eight villages in which I worked was as stunning as it was immediate. The four villages that were accessible by road experienced dramatic improvements, both in terms of nutrition and the well being of the people. New IR-8 rice spread rapidly as peasant farmers with small plots were suddenly able to experience both increased yields and double crops. This in turn led to tangible improvements in the quality of life: child mortality dropped; malnutrition abated; and children, especially girls, stayed in school longer.

At the same time, there was a rapid corresponding decrease in the level of armed conflict and military hostilities. It was as though the combination of new roads and new rice seed caused the roots of violent extremism to wither and disappear in a way that military action alone could not. By contrast, the four other villages, with no bridges and no road access, remained mired in poverty: the new "miracle seeds" were not put to use; children remained stunted; and warfare and political dissidence continued there unabated.

This experience seemed to confirm one of the central lessons of Norman Borlaug's boyhood—the ability of agricultural innovation and rural roads to dramatically change social conditions.

THE NOBEL PRIZE

Dr. Norman Borlaug was presented the Nobel Peace Prize in 1970 for his accomplishments in India and Pakistan and for his role as Father of the "Green Revolution." It is indicative of the kind of person he is that when, on October 20, 1970, the phone call came to advise him of his selection as the Laureate, Borlaug was in a remote farm field in Mexico. Margaret had to drive for over an hour to tell him the news and ask him to return home to respond to the calls, and the concomitant press re-

quests for interviews. Lennard Bickel, in his 1974 biography of Borlaug, *Facing Starvation*, describes Norm's reaction: He told Margaret that he didn't see how he could possibly come to speak on the phone since he and his assistants still had much more work to do. He then went back to recording data on his test plots. It was there that the TV camera crews found him two hours later.

In a sense, when Borlaug received the Peace Prize on December 10, 1970, his life had come full circle. Here he was, the son of immigrants who had left Norway due to extreme food shortages, now, back in their country of origin to receive one of the world's highest honors for his role in increasing the world's food supply. As he stood in the great hall of the University of Oslo, Borlaug was lauded as an "indomitable man who fought rust and red tape . . . (and) who more than any other single man of our age, has provided bread for the hungry world."

Borlaug remains the only agricultural scientist ever to receive the Nobel Peace Prize, and one of its least known recipients. I recall reflecting as he sat among many other laureates for the 100th Anniversary "class picture," that it was ironic that his name would be so little recognized, since compared to the other, more celebrated honorees, he had probably saved more lives than all of them put together.

In his laureate address, Borlaug stressed that the agricultural breakthrough achievements for which he was being honored were only providing a brief window of time during which the world must confront the specter of a burgeoning world population which would have to be fed. As a result, Dr. Borlaug's efforts did not cease or even slow after this recognition by the Nobel Foundation. While many individuals might consider retiring after receiving such recognition, Dr. Borlaug has worked even harder in the 30 plus years since his selection as the Peace Prize Laureate in the struggle against world hunger and malnutrition. In his ninth decade of life, Dr. Borlaug keeps a heavy travel schedule, pressing forward with projects in Africa, passionately advocating the primacy of science and technology in improving global food security, devoting significant time and energy to education, and promoting biotechnology as a way to preserve the environment.

Among Dr. Borlaug's greatest accomplishments since his selection as a Nobel Peace Prize Laureate are

- His leadership with former President (and fellow Nobel Peace Prize Laureate) Jimmy Carter and The Carter Center, of The Sasakawa

Global 2000 Program, which has promoted the production of Quality Protein Maize in sub-Saharan Africa, countering Marasmus and Kwashiorkor, and other forms of acute malnutrition for millions of at-risk children

- The founding of the World Food Prize, which exists to recognize and inspire Nobel-like achievements in food and agriculture
- His 30-year relationship with China as that country's agriculture was transformed
- His prodigious efforts to educate the next generation of students and leaders on the crucial importance of world hunger and food security

BRINGING THE GREEN REVOLUTION TO AFRICA

Since 1986, Dr. Borlaug has headed the Sasakawa Africa Association whose programs aim at defeating malnutrition and poverty in Africa. Its activities center on bringing science-based crop production methods to the small farms of sub-Saharan Africa. Proven agricultural technology is the key to overcoming widespread food shortages that condemn millions of people in Africa to lives of hardship and hunger.

Part of the Sasakawa Global 2000 endeavor, Sasakawa Africa projects are under way in a dozen African countries. In addition to its partnerships with ministries of agriculture, the Sasakawa Africa Association collaborates with NGOs, businesses, and international development agencies. Perhaps the most significant achievement of this effort is the successful development of highly nutritious corn—known as Quality Protein Maize—which offers great promise in preventing acute malnutrition among children in Ghana, Mozambique, and other African countries, as well as in Mexico. Perfected by a longtime Borlaug protégé at the Maize and Wheat Improvement Center in Mexico, Dr. Borlaug and the Sasakawa Africa Association have helped spread this lifesaving food into villages with immediate effect, enhancing and saving the lives of thousands and thousands of children.

THE WORLD FOOD PRIZE

One of Dr. Borlaug's most lasting contributions may be the creation of the World Food Prize. Norm has often said he believes he was nominated for the Nobel Peace Prize because there is no Nobel Prize for agriculture or efforts to counter poverty and hunger. Laureate Borlaug felt there should be, so shortly after receiving the Peace Prize, he approached

the Nobel Committee urging the creation of a new Nobel Prize for Agriculture. But it was not possible. Not even Borlaugian grit and determination could change Alfred Nobel's will. Undeterred, Norm set out to create just such an honor. In 1986, with the assistance of Carleton Smith and the support of the General Foods Corporation, he established a new award to recognize exceptional achievement: the World Food Prize.

The Prize of \$250,000 is now endowed by philanthropist and businessman John Ruan, himself with origins in a small Iowa town just like Borlaug. Ruan "rescued" The Prize when General Foods withdrew its sponsorship in 1989. He moved it to Des Moines, Iowa, Borlaug's native state, and established a foundation with a bipartisan Council of Advisors that includes former U.S. Presidents Jimmy Carter and George Bush; Pulitzer Prize winner Michael Gartner; former cabinet members Elizabeth Dole (now Senator from North Carolina) and Robert McNamara; and the Honorable Olusegun Obasanjo, now President of Nigeria.

Ruan, who serves as Chairman of The World Food Prize Foundation, stressed that he took this action because The Prize is now even more vital to inspiring a second green revolution that is necessary to prevent the possibility of future food crises. "Right now, close to one billion people still suffer from malnutrition, nearly one-sixth of the world population, primarily women and children, infants, and the unborn," Ruan points out.

In addition to the Laureate Award Ceremony, the World Food Prize holds an International Symposium and a Global Youth Institute each October to foster a dialogue on world hunger and related issues. Recent symposium topics focused on the safety of genetically modified crops, the relationship between food security and the potential for agroterrorism, and the coming global water crisis.

The World Food Prize has honored those who have made the most significant contributions to improving the quality, quantity and availability of food. Swaminathan, Barwale, Beachell, Khush, and Chandler all eventually became World Food Prize Laureates. Other recipients of The Prize include experts and scientists from China, Bangladesh, Switzerland, the United Kingdom, Denmark, Cuba, and the U.S.

OPENING TO CHINA

One of the World Food Prize Laureates was He Kang, the former Chinese Minister of Agriculture who was honored in 1993 for implementing the policies that moved China to self-sufficiency in grain in a

remarkably short period of time. Minister He and many of the agricultural scientists in China look to Dr. Borlaug as an “old friend” who provided them significant assistance along this road to success. Borlaug’s spring wheats went to China, via Pakistan, during the late 1960s. They were crossed with Chinese wheats, as well as directly selected for use. Borlaug himself led the way in establishing connections between China and the West. He has been going to China since 1974, one of the first scientists from the West to begin visiting there. He was there again in 1977 and at various times during the 1980s and 1990s. He has traveled extensively in the country, initially to wheat-growing areas, and over time to maize and other agricultural areas, talking with farmers and urging adoption of approaches he developed. During these visits, Borlaug has seen the tremendous improvements that have taken place since the collapse of the Cultural Revolution, particularly beginning in the watershed year of 1978. Borlaug often traces this success to the changes in Chinese nutrient management strategies, moving from a reliance on organic recycling of manure, through the building of small-scale plants and imports, to Chou en Lai’s authorization of the purchase of multiple large-scale nitrogen plants.

Reflecting the friendship and spirit of cooperation he has always demonstrated in his relationship with Chinese scientists and policymakers, Norman Borlaug was made an honorary member of the Chinese Academy of Agricultural Sciences in 1994.

YOUTH EDUCATION

Dr. Borlaug has been committed to youth activities and education throughout his career. While pursuing breakthroughs in plant science in Mexico, he served as scoutmaster for his local Boy Scout Troop, and as a Little League baseball coach. Even today, he continues to devote himself to passing on to the next generation his passion for science and education as the means to uplift people mired in poverty. Thus, between attending conferences and giving lectures around the world, he continues to teach at Texas A&M University, where he holds a post as a Distinguished Professor in the Department of Soil and Crop Sciences.

To promote interest in global food security, in partnership with John Ruan, he created The World Food Prize Youth Institute, which is held in conjunction with The World Food Prize International Symposium each October in Des Moines. There, high school students interact with Dr.

Borlaug, World Food Prize Laureates, and other experts to discuss the potential solutions to world hunger and the roles they, the leaders of tomorrow, might play in making them a reality.

Under Dr. Borlaug’s direction, the Youth Institute has developed an International Internship program, which sends exceptional high school students on eight-week internships to international agricultural research centers in Ethiopia, Kenya, India, Indonesia, the Philippines, Thailand, Mexico, Peru, Brazil, Malaysia, Costa Rica, Trinidad, and China. He wants them to have that same type of life-altering experience that he had when he heard Elvin Stakman speak on that cold Minnesota night in 1937.

When speaking to young people in the early years of the 21st Century, Borlaug often quotes Thomas Jefferson as rhetorically asking whether

Ease and security—were these the drugs that abated the eternal challenge of the minds of men? . . . Did nations like men become lethargic when well fed and bodily comfortable?”

It is clear that Borlaug worries that this may be the case, particularly now that almost all young Americans are physically removed from farming, and the connection between our food supply and agriculture production is no longer so clearly understood. But no doubt, he takes heart when some of the students returning from their eight-week World Food Prize International Internships volunteer that coming face to face with third-world poverty was a life-changing experience, perhaps not unlike Borlaug’s own epiphany as he listened to his mentor—Elvin Stakman—almost 70 years ago.

CONCLUSION—APPLYING THE LESSONS OF THE 20TH CENTURY

Exhibiting the virtues he learned growing up, Norm Borlaug is still going strong, traveling the world to promote greater attention to—and investment in—rural infrastructure (particularly roads and bridges), agricultural research, and education. Norm believes all these are essential if we are to have the next green revolution—the one that will lift the remaining one billion people out of the misery of malnutrition and end pandemic poverty.

In his speeches he advocates biotechnology and the crucial role he sees for it in feeding and enhancing the nutrition of those still in tenuous food-security situations, particularly in Africa. Genetically modified crops are controversial, but, never one to back away from a confrontation, Borlaug argues that we must rely on science and research to answer the questions about whether GMO foods pose any environmental risks. At the same time, he stresses that what is needed is not just miracle seeds and other agricultural inputs, but also the educational facilities to uplift the young and logistical infrastructure (such as roads and railroads) to make Africa prosper.

He laments the declining trend in support for public agricultural research, such as at CIMMYT, where the crucial discoveries that led to the first green revolution took place. In June 2002, he and all the living World Food Prize Laureates issued a statement at the World Food Summit in Rome calling for a reversal of this trend.

And when he concludes his remarks, something of the old forester comes to the fore. Borlaug points out that with the earth's population increasing exponentially, all these new people can be fed in only one of two ways. Either we significantly increase yields on the land now in production, or we plow under the remaining rainforests and other habitats for wild animals in order to have more land to farm. Biotechnology, he stresses, will help preserve the ecosystem while also reducing hunger and malnutrition, by providing these increased yields. In that way, he once told a group of Iowa high school students, he may be saving more trees as a plant pathologist than he would have as a forest ranger.

But, I believe Norm Borlaug's message may be just as relevant for those who seek to counter terrorism and bring a lasting peace in the Middle East and South Asia. Just as I saw the first green revolution evaporate political and military hostility more than 30 years ago in the Mekong Delta, it just may be that a new green revolution (and the roads to make it happen) represents one of the most potent forces available to this generation to dissipate the sources of terrorism, which breed and are sustained in the poorest parts of the world, such as Afghanistan and Somalia.

As the person who has probably saved more lives in the Islamic world than anyone who has ever lived, it would be only fitting if Norman Borlaug's 20th century message of using seeds and roads to reach across political chasms to uplift humanity would be the vehicle that brought peace and reconciliation to a deeply troubled and divided 21st century world.

NOTES

1. Kenneth M. Quinn is President of The World Food Prize Foundation, a nonpartisan organization dedicated to inspiring breakthrough achievements that can lessen hunger and malnutrition around the world. He served as U.S. Ambassador to Cambodia from 1996 to 1999. Readers may write him at The World Food Prize Foundation; 1700 Ruan Center; 666 Grand Avenue; Des Moines, IA 50309. More information about the World Food Prize and International Symposium is available on the web at <http://www.worldfoodprize.org>.