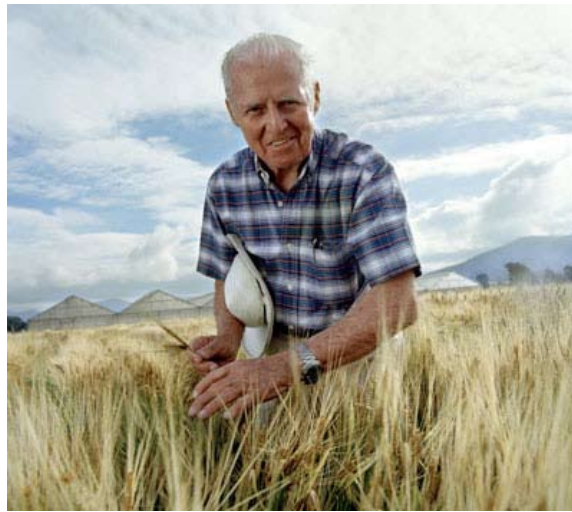

The Greatest Man You Have Probably Never Heard Of

Savior of Hundreds of Millions of
People - Norman Borlaug

By William Schub

Gene, the Greenville Coop fertilizer plant manager, popped his head in the door of my office - "Has Earl Borchert found you? He's looking all over for you." I felt a flash of anxiety. It was the fall of 1982, and Earl was one of my first clients as the new manager of a crop consulting cooperative in eastern Wisconsin. Earl had put a 40-acre field of soft red winter wheat into his contract acreage, but when he saw my recommendation for 100 pounds per acre of nitrogen he about flipped. "Your nuts! Have you ever worked with wheat before? It'll all go down! You can't put that much nitrogen on wheat!" A challenge like that is bound to rattle the confidence of a rookie, but I stuck to my guns. I explained that Argee was a short, stiff-stalked variety that could handle it, and that we were shooting for a hundred bushels per acre. Earl's eyes widened - now he knew without a doubt that I was nuts. He had never seen more than 45 bushels per acre in his life, nor had his neighbors. Everyone knew that wheat lodged (fell over) with high nitrogen.

I managed to calm Earl down and convinced him to stick with it on one field as a trial for a year, but all summer long he barked at me every time a blade of wheat leaned over; and all summer long I tried my best to boost his confidence - and maybe my own as well. After all, this was my first try too. Now the



crops were in. This was it. Gene continued - "Earl's been running around telling everyone he got about 120 bushels to the acre. He wants your recommendation for more next year." The next year I had several more clients putting wheat in the program. One skeptical coop director was whistling after his harvest - "Never seen anything like it in my life. I was dumping the hopper every pass around the field!"

There was nothing brilliant in my recommendations. All I was doing was working one-on-one with some very good farmers, and giving them the same recommendation that any Extension wheat specialist would have. I was bringing them up to date on what many Mexi-

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cans, Pakistanis and Indians already knew - that the face of world agriculture had changed - and that heretofore unheard of yields were possible. Norman Borlaug was the one who had taught them, and in doing so he had saved millions of lives - perhaps more than any man in history.

To give you a little background, in 1968 much of the world was supposed to be teetering on the edge of starvation. Agricultural production in Mexico had been losing ground with the population, India was increasingly unable to produce enough food to be self-suf-

ficient, and Pakistan was on the verge of a catastrophe. Professor Paul Ehrlich, an advocate for population control, had been trying to harness the new and increasingly powerful environmental movement to adopt population as one of its major platforms. With the encouragement and collaboration of David Brower of the Sierra Club, Ehrlich had just published *The Population Bomb*. The Bomb, as its authors abbreviate it, was the 60's equivalent of global warming in the genre of non-

fiction scientific catastrophism. It confidently predicted massive world starvation within ten years. According to Ehrlich's 1968 prologue:

"The battle to feed all of humanity is over. In the 1970s the world will undergo famines - hundreds of millions of people are going to starve to death in spite of any crash programs embarked upon now."

It didn't happen. Elsewhere, and unknown to the Ehrlich's sources, conscientious and talented men and women were dedicating their lives to the achievement of food self sufficiency in the third world. One of the most dedicated and successful was Norman Borlaug. In 1943 Secretary of Agriculture, Henry Wallace, was attempting to provide agricultural aid for Mexico. Unable to

obtain an appropriation from Congress, Wallace brokered an aid project funded by the government of Mexico and the Rockefeller Foundation. One of the aid workers was Borlaug, a plant pathologist and breeder with a Ph.D. from University of Minnesota. Borlaug's concept was simple. As a pathologist he understood that a lot of the world's food production was lost to insects and disease. As a breeder, he understood that the genetic yield potential of most food plants far exceeded contemporary production due to insect and disease susceptibility, and other limiting factors. The idea was to

use modern agricultural practices, including the surge in the production of fertilizer enabled by the petroleum industry and the industrial development of the Haber-Bosch Process for producing ammonia, and enhanced breeding to remove yield impediments, and disseminate those improvements where they would most help the world's people.

The first breakthrough was literally the multiplication of wheat yields. Contemporary production wheat varieties were mostly tall and susceptible to lodging. High nitrogen fertilizer applications, which are required to produce optimal grain yields, exacerbated the crop's susceptibility to lodging. Elsewhere, at the University of Washington, a wheat breeder named Orville Vogel had obtained from Japan a short stiff-stalked wheat variety (labeled Norin 10 Brevor semidwarf) which was capable of withstanding high nitrogen applications, and was working with other high-yielding wheats to produce high-yielding varieties adaptable to North American conditions. Vogel generously shared his genetic material with Borlaug in Mexico. Borlaug then set about cross breeding the Norin 10-Brevor genetic material with wheat varieties adaptable to Mexico. In doing so he devised methods for accelerating the breeding process, including double breeding seasons. This he accomplished by planting the summer season in the Mexican highlands of the Central Plateau, and then planting the winter season in the hot moist climate of the Caliente. These methods not only speeded the development of new varieties, but incidentally produced varieties robust to a wide range of climatic environments. Within 20 years Borlaug had developed high yielding wheat varieties adaptable to tropical conditions.

By 1968 Borlaug and his colleagues



had been highly successful in Mexico. Wheat production had multiplied by a factor of six since 1944, almost entirely due to the new varieties and corresponding cultural methods; and even as Ehrlich published *The Bomb*, the breeders were preparing to move their program to India and Pakistan. The obstacles to the expansion of their program were daunting. In transit to India from Mexico via Los Angeles, they were, at first, barred from transporting their wheat across the U.S. Border. They were then delayed in shipping from Los Angeles by the California National Guard because of the Watts race riots. Once in India they found the food situation so critical that they elected to skip adaptive research and moved directly into seed-stock multiplication for production. At first they experienced poor germination of their seed stock due to long storage, but they countered by doubling the seeding rate. Borlaug's group worked under conditions of war between India and Pakistan to promote and disseminate their new varieties. They also faced cultural resistance, and even riots from some who preferred rice as their diet staple. But in the end their efforts, and the dire needs brought on by wartime famine, prevailed. In 1968 Ehrlich had stated that:

“I have yet to meet anyone familiar with the situation who thinks India will be self-sufficient in food by 1971,”

and:

“India couldn't possibly feed two hundred million more people by 1980.”

Yet, by 1974, due to efforts of Borlaug's group, India was fully self sufficient in all cereals, and Pakistan was well on the way to self sufficiency. At the turn of this century, cereal production in India and Pakistan, as in Mexico, had increased about six fold, outpacing the demands of increased populations.

The world-wide multiplication of yields, which has come to be known as the green revolution, has been accomplished through the work of many. When I was a college student in the 1960s, average corn yields were in the range of 80 to 100 bushels per acre in the northern U.S. corn-belt. But the development of prolific varieties that were capable of adjusting yields to drought stress and plantings at high populations nearly doubled yields by the early 1980s. My clients in northeastern Wisconsin were averaging about 150 bushels per acre with 100-day corn. In the early 1980s Dr. Jim Bauder of the University of Minnesota (later Montana State University) published a paper in the journal *Crops and Soils* predicting 300 bushel corn in the northern corn-belt. Some producers in Illinois and Iowa are now pushing toward that goal with yields above 200 bushels per acre when rainfall is adequate. Nearly every type of crop has been improved in yield potential, disease resistance, and insect tolerance. Success with semi-dwarf wheat in the orient led to the development of high-yield semi-dwarf rice cultivars at the International Rice Institute, funded by the Ford and Rockefeller Foundations at China's Hunan Rice Research Institute. Borlaug's colleagues at

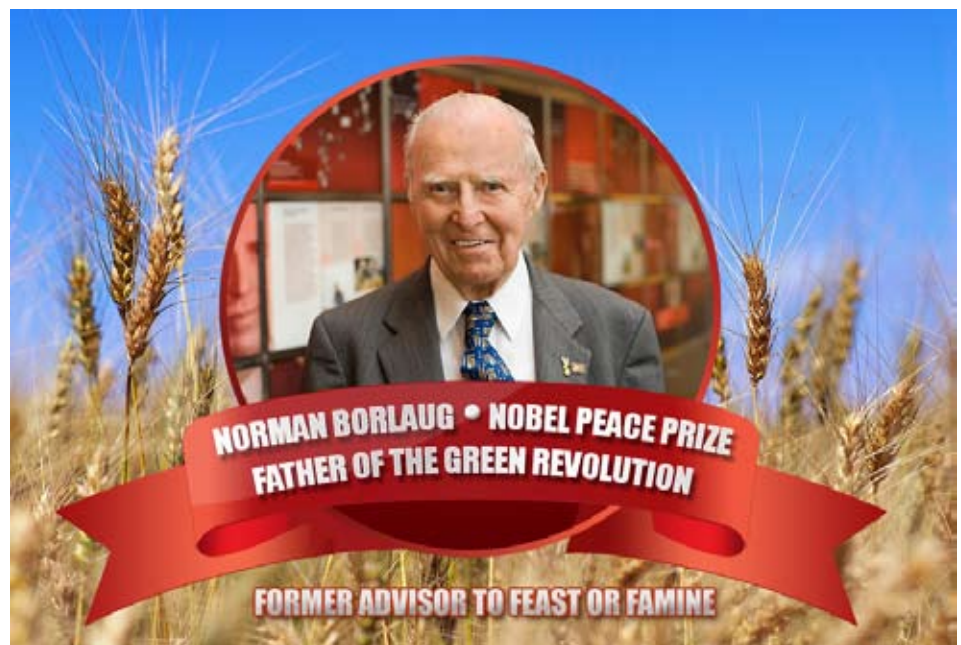
“Whoever thinks marriage is a 50-50 proposition doesn't know the half of it.”

- Franklin P. Jones

the Consultative Group on International Agricultural Research developed and introduced the high-yielding rice varieties throughout Asia.

Not everyone was pleased with Borlaug's mission and work. Introduction of high yield agricultural practices led to the expansion of roads and other infrastructure into undeveloped areas to move products and supply farmers with raw materials for production and consumer products for life improvements. The expanding international market for fertilizer, herbicides and pesticides was panned as "profits for big business" in the United States and Europe; and population control advocates asserted that increasing food led to increased population, and that it was better to leave things as they were. Environmentalist pressure eventually led to the abandonment of Borlaug's work by the World Bank and the Rockefeller Foundation. Funding was cut for the International Maize and Wheat Center in Mexico where Borlaug had developed his wheat varieties. In the 1990s, when Borlaug attempted to initiate a program to enhance agricultural self sufficiency and stave off starvation in sub-Saharan Africa, Borlaug was refused funding and assistance through the pressure of those groups. Eventually, Borlaug obtained financial support from Ryoichi Sasakawa, a wealthy Japanese shipping magnate, and later received support from Catholic Relief and Oxfam. But little assistance materialized from the major foundations or from western nations.

Now a great deal can be written to explore the assumptions, simplistic fallacies, and brutal implications of the mind set that that has so impeded agricultural progress in Africa, and increasingly threatens to overturn the advancements of the green revolution. To be certain high yield agriculture can cause environmental problems if improperly implemented. All changes entail problems. But scientifically developed improved agricultural practice is capable of solving those problems. Accusations that feeding people better leads to population expansion and the destruction of wildlife habitat are countered by the fact that the ability to multiply yields by renewing the fertility and productivity of fields results in far less need for production land, and allows for more idle land than slash-and-



burn agriculture. A reasonable discussion of all these issues is beyond the scope of this short essay. But the simplest food for thought might rest for now on the fact that the underlying assumption is that it is appropriate and acceptable to allow large numbers of people to suffer severe privation and starve. In this writer's view it bears a crude resemblance to the philosophies and methods practiced in the "natural" management of wildlife populations – only applied to human beings. I will leave this complex and disturbing discussion for another time.

I have had the privilege of being addressed by Dr. Borlaug twice: once with a small group of graduate students and professors, at a seminar in the Soil Science Building (later named Borlaug Hall) at the University of Minnesota in 1980 (10 years after he received the Nobel Peace Prize in 1970), and again, before thousands, in what was stated to be his last public address at the 100-year anniversary of the American Society of Agronomy at New Orleans in the Fall of 2007. In the first, to our embarrassment, our slide projector proceeded to melt the great man's slides, so we ended up with an impromptu and intimate discussion of his work. At a time when the onslaught of the environmental movement was just beginning to take its toll on the green revolution, Borlaug explained in the strongest terms that we cannot feed the people of the world and share half of the crop with insects and disease – nor

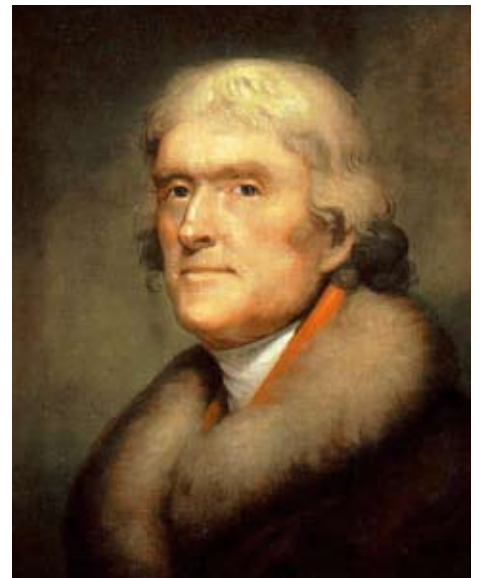
can they be fed using slash and burn agriculture. He strongly defended that the balanced and appropriate use of fertilizer and pesticides is absolutely essential for human sustenance, and the advancement of human welfare. To Borlaug, both feeding people and retaining surplus land for wildlife and other purposes depended critically on the advancement, not the regressive rejection of modern agricultural science. At New Orleans, amidst a trendy buzz centered on research grants in carbon sequestration and other initiatives focused on global warming, he addressed several thousand plant, crop and soil scientists on the importance of feeding people. This, he stated – not attenuating global warming was the primary challenge facing them. I watched with some amusement as snarls began to gnarl the faces of some tilley-hatted prophets to my left – but they were slowly and painfully dragged to their feet by sheer embarrassment in the thundering standing ovation that was delivered by the world's crop scientists, as they honored the final public address of what may have been the greatest man of the last century.

By various estimates Dr. Norman Borlaug is credited with saving hundreds of millions, or as many as a billion of the world's most vulnerable people from a wretched death by starvation over the course of a career that spanned a little more than a half century. Many more people, indeed most of the world has



National Medal of Science awarded by President George W. Bush on February 13, 2006

in the service of his fellow man. In the bloodiest century in human history, which witnessed the willful slaughter of more than a hundred million people through genocidal pogroms and wars, and the loss of countless more lives through famine and disease, Borlaug's life work shines like a candle in a dark cave. Dr. Norman Borlaug passed from our midst on September 13, 2009. May God hold him close. And for the sake of us all, may the work of those who would undo his work be undone.



reaped the benefits of the green revolution through better and cheaper food. Borlaug certainly didn't do it alone. The green revolution, from which we all have benefited in ways that few really comprehend, was the work of thousands of dedicated men and women, who achieved an astounding half century of agricultural advancement, and continue to do so. But what Norman Borlaug represented most uniquely was a passion to adapt and carry those advances to the other half of the human race – those most vulnerable – the people on the edge. You know - the ones some people think we ought to let starve so we can all have a little more elbow room. And beyond the passion, Borlaug represented the dedication, persistence and creativity to make it happen in the face of daunting obstacles of every ilk: agronomic, political, financial, cultural, and ideological. I do not believe that any man or woman in the previous century can match his accomplishment

Note: Several sources have been used as background for this essay. The interested reader is first referred to Gregg Easterbrook's excellent article *Forgotten Benefactor of Humanity* for an in depth biography, published in *The Atlantic* in January of 1997, and available at *The Atlantic Online*, <http://www.theatlantic.com/issues/97jan/borlaug/borlaug.htm>. A thorough biography with photographs (the source of photos used here) is the *World Food Prize Site: Dr. Norman E. Borlaug, 20th Century Lessons for the 21st Century* at: <http://www.worldfoodprize.org/borlaug/borlaug-history.htm>. Editor-in-Chief Jay Ambrose, of *Scripps Howard Newspapers*, published a fittingly titled memorial, *Norman Borlaug vs. the killer greenies*, possibly still available (for a limited time) online through the *Dickinson Press* at <http://www.thedickinsonpress.com/eve/t/article/id/27613/group/Opinion>.

Becoming Jefferson's People

Re-inventing the American Republic in the Twenty-first Century

By Clay Jenkinson

The Active Life

"I am for encouraging the proW-alking is the best possible exercise. Habituate yourself to walk very far. The Europeans value themselves on having subdued the horse to the uses of man; but I doubt whether we have not lost more than we have gained, by the

It makes the state Tax Dept. feel good -- the number of ND millionaires (adjusted gross income over \$1 million) rose to 470 in 2008 compared to 270 in 2005. The big reason, you guessed right, oil company payments.