

Norman Borlaug

Plant science pioneer whose work developing hardy crops is credited with saving a billion lives

NORMAN BORLAUG, who died on Saturday aged 95, won the 1970 Nobel Peace Prize for his achievement in promoting the use of more productive cereal strains in order to feed the world's vast population of the starving; his efforts to introduce hybrid cereal varieties into agricultural production in Pakistan, India, Mexico and other developing countries are estimated to have saved about a thousand million people from dying of hunger.

Borlaug spent his life on the borders of traditional agriculture and biotechnology and stood at the centre of the greatest and most dramatic success stories in world farming — the so-called "Green Revolution" of the 1960s. Perhaps more than anyone else, he was responsible for the fact that throughout the post-war era, except in sub-Saharan Africa, global food production has expanded faster than the human population, averting the mass starvation that were once widely predicted.

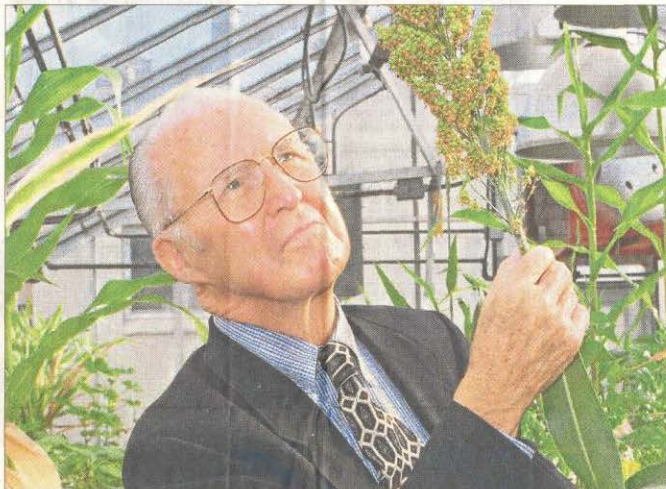
But Borlaug's "Green Revolution" was not "green" in the modern sense. High yields demanded artificial fertiliser, chemical pesticides and new soil technology. As a result of this he was vilified by many in the environmental movement in the securely affluent West, some of whom argued that higher food production sustains more people and thus poses a threat to the natural environment.

It was somewhat ironic, therefore, that his interest in plant breeding had been sparked by his own horror at the environmental devastation and dustbowls of the 1930s, when native deer and wild turkeys disappeared from the American Midwest. Many blamed the phenomenon on a combination of technological farming and dry weather conditions. But Borlaug's staunch belief that the problem was not too much technological farming but too little has proved to be the correct one. The introduction of new, drought-resistant strains of crops has made dust bow conditions rare because few crops have failed. Moreover, more productive hybrids have enabled marginal land to be taken out of production; wild areas have been reclaimed for nature and the deer and wild turkeys have returned.

Borlaug believed that similar results could be achieved elsewhere.

It was also largely left to Borlaug to argue the moral imperative of food for the world's malnourished — whether they "should" have been born or not, he argued, once alive they must have enough to eat.

Norman Ernest Borlaug was born in the small Norwegian-American



Borlaug: the 'Green Revolution' won him the Nobel Peace Prize but later faced a backlash from environmentalists

farming community of Saude, near Cresco in Iowa on March 25 1914. He grew up on his father's small grain and livestock farm and, after graduating from Cresco High School, studied at the University of Minnesota where he gained a degree in Forestry and was a member of the university's wrestling team.

After graduation, he worked for a time in the forestry service in Massachusetts and Idaho, but the job fell through. He then began a graduate degree, followed by a doctorate, in plant pathology. After three years of research work at Du Pont de Nemours in Delaware, in 1943 Borlaug joined the Rockefeller Foundation co-operative project with the Mexican Ministry of Agriculture, set up to solve the problem of the devastation of the country's wheat harvests by stem rust. Except for brief intervals, he lived in the developing world from then on.

Borlaug and his colleagues developed a drought-hardy, rust-resistant strain of wheat, then crossed it with a dwarf Japanese strain to produce a hybrid short enough to survive the wind, and channel growth into grain. Once the Rockefeller's Mexican programme was producing high-yield dwarf wheat for Mexico, Borlaug began to argue that farmers in other areas of the world would benefit from growing similar crops. The

proposition was controversial since it implied replacing indigenous Indian and African crops such as lentils and cassava with "Western" crops such as wheat. In 1963, the Rockefeller Foundation and the government of Mexico established the International Maize and Wheat Improvement Centre (CIMMYT), as an outgrowth of their original programme, and sent Borlaug to Pakistan and India, which were then descending into famine.

At first Borlaug failed to persuade the state-owned seed and grain monopolies to switch to high yield crops. But by 1965 famine was so bad that the governments agreed to try his dwarf wheat. A shipment was arranged from America, but the India-Pakistan war intervened.

Nevertheless Borlaug and local scientists planted the first crop of dwarf wheat, sometimes working to the sound of artillery. Sowed late, the crop germinated poorly, yet yields rose by 70 per cent. This prevented general starvation in the region, although there were riots in Kerala when local people were presented with sacks of wheat flour instead of the traditional rice.

Owing to the wartime emergency, Borlaug was given the go-ahead to try again the following year. The results exceeded all expectations. By 1968 Pakistan was self-sufficient in wheat production; India followed a few years later. Since the 1960s, food production in both countries has

outpaced the rate of population growth and, in the mid-1980s, India even became a net exporter. In 1968, the administrator for the US Agency for International Development (USAID) wrote in his annual report that the phenomenal improvement in food production in the subcontinent looked like "a Green Revolution" — which was how it came to be known.

In the 1980s, the "Green Revolution" spread to China, which is now the world's biggest food producer, but by the time Borlaug began to turn his energies to Africa, where Malthusian mass starvation was still a plausible threat, a backlash had set in.

Notwithstanding the fact that Borlaug's initial efforts in a few African nations yielded the same rapid increases in food production as did his efforts on the Indian subcontinent, environmental lobbyists persuaded Borlaug's backers in the Ford Foundation and the World Bank to back off from most African agriculture projects. The Rockefeller Foundation too backed away partly because it was shifting toward an emphasis on biotechnological agricultural research. Borlaug, once an honoured presence at international symposia, began to feel like a pariah.

The opposition to Borlaug's intensive farming methods was exacerbated by the negative

publicity surrounding genetic engineering. Borlaug's work was not, properly speaking, in genetic modification. He used so-called natural methods of plant breeding and was wary of the monopolistic agenda of big agribusiness.

But he saw genetic modification as only a refinement of old plant breeding methods and became a strong advocate of its possibilities, both to enable more mouths to be fed and to help the environment. By producing more food from less land, Borlaug argued, high-yield farming would help preserve Africa's wild habitats from further depletion by slash-and-burn subsistence agriculture. The battle over biotech products, he reflected bitterly, was being fought mainly in the rich West, where "governments collectively subsidise their very small farming populations to the tune of \$350 billion a year and where many of the major problems of human nutrition are related to obesity".

In 1984, at the age of 71, Borlaug was drawn out of retirement by the Japanese industrialist Ryoichi Sasakawa who, with former American president Jimmy Carter, was working to improve African agriculture.

In 1986, Borlaug became president of the Sasakawa Africa Association, and leader of the Sasakawa-Global 2000 agricultural programme in sub-Saharan Africa, which has worked with several million farmers in 15 countries to increase food production.

Borlaug remained Senior Scientist at the Rockefeller Foundation and, in 1984, joined the Department of Soil and Crop Sciences at Texas A&M University as a Professor of International Agriculture.

In 1985, he was the driving force behind the establishment of the World Food Prize, which is awarded annually in recognition of outstanding achievement in the fields of food production and nutrition.

Borlaug held numerous honours and awards, including the American Medal of Freedom, which he received in 1977; the Vannevar Bush Award for lifetime achievement in science (2000); and the Public Welfare Medal of the National Academy of Sciences (2002). He held 50 honorary doctorates and belonged to the academies of science in 12 nations.

He served on two Presidential Commissions; on World Hunger (1979-79) and on Science and Technology (1990-92). He was also a member of the American Wrestling Hall of Fame.

Norman Borlaug married, in 1937, Margaret Gibson, with whom he had a son and a daughter.