

ТКІВИТЕ

Yuan Longping, 1930-2021 The "Father of Hybrid Rice"

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Yuan Longping began his college education in 1949, the same year that the Chinese Communist Party entered Beijing and proclaimed the People's Republic of China. While he never became a Party member, Yuan Longping's career would have remarkable parallels to the history of the Party and its policies over the next seven decades.

Born in Beijing in 1930 to parents who were both teachers, young Yuan Longping and his family were shuttled about the country by the upheavals that affected much of China, including the Japanese invasion, World War II, and then the civil war between the Kuomintang and Communists. At age 19, and living far from the capital city, Yuan Longping entered Southwest Agricultural College, a newly established regional institution near Chongqing.

At that time, Yuan Longping, with no family background in farming, would have seemed an unlikely candidate to become an agronomist, much less one whose extraordinary achievements in increasing rice production would mark him as the most impactful plant scientist on the planet at the time of his passing and one of the great, if not the greatest, agricultural scientists in the history of China.

When he graduated in 1953, China had already begun another even more tumultuous period, especially in agriculture and food production, a timeframe that would last two decades with disastrous consequences. The commune-based system of farming as well as severe limitations placed on approaches to agricultural research, which permitted only the Soviet approach to grafting and excluded genetics-based inquiries, set the stage for a catastrophe in just a few years.

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The millions of famine-related starvation deaths that followed the Great Leap Forward in the late 1950s affected Yuan Longping deeply. As he would later write, his own experience of severe food deprivation, combined with seeing the bodies of starvation victims along roads, produced deep reactions. His hunger pangs caused him to have dreams of creating paradise-like gardens, which, like a cornucopia, were overflowing with abundant food. At the same time, those visions and the suffering he witnessed instilled in him an intense motivation to apply science to increase the yield of his country's most essential crop – rice.

That latter goal would, however, be delayed by the Cultural Revolution in the 1960s, which would further disrupt the country, producing political tumult and preventing scientists, including Yuan Longping himself, to undertake sustained research. Deeply influenced by his mother, an English teacher who gave her son the gift of a second language, Yuan said he secretly read about Gregor Mendel and other pioneers of science late at night.

As the Cultural Revolution waned in the early 1970s, and efforts to improve national life were slowly implemented, the new atmosphere permitted a gradual return to science. Reflecting this revised approach, Dr. Norman Borlaug was invited to visit China in 1974, and even though his access to colleagues with whom he had studied at the University of Minnesota was still circumscribed, this slight opening of China's door signalled the beginning of a new era. It was the start of a process that would transform China, and allow Yuan Longping to fulfil his earlier hunger-induced vision of producing rice plants so tall and filled with so much grain that they provided shade under which he could lie down and rest.

Having attained a teaching position at Hunan Agricultural University in Anjiang, and later at the Hunan Academy of Agricultural Sciences, his focus turned to what would be the central achievement of his life – the development of hybrid rice. The introduction of heterosis – the increase in progeny by marrying two different varieties, as accomplished by Borlaug in wheat and Henry A. Wallace in corn – was believed to be unattainable in a crop like rice, which reproduced asexually.

Driven by a determination that would rival Borlaug's, Yuan persisted in his belief that he could find the solution. That his breakthrough would come from a discovery in nature in a remote setting near a railroad track just outside the city of Sanya on Hainan Island, and not in a laboratory or test plot at a research centre, is indicative of Yuan Longping's character. A preference to be out in the fields among farmers, and a propensity for work clothes rather than more formal attire were tendencies he carried with him until his last days. Indeed, it was a fall he suffered while in a rice field in March 2021 that led to the rapid decline of his health, and his death on May 22.

Yuan Longping's discovery of hybrid rice and his ability to scale it into a production system in 1976 almost immediately increased internal rice production in China by

20 percent. His seeds spread across China just as the country's politics were coalescing, and contributed significantly to lessening hunger at a time when extreme poverty and food shortages were still prevalent. So directly impactful were his contributions to reducing this country-wide suffering that Yuan Longping's name would be prominently written into the textbooks read by every schoolchild in the country.

In 1978, Deng Xiaoping's introduction of the new policy of opening up to the world permitted Yuan Longping to share his research and achievements outside China, especially with the leading plant scientists at the International Rice Research Institute (IRRI) in the Philippines. IRRI was the centre at which, in the 1960s, scientists developed high-yielding IR8 seeds, the dramatic impact of which I observed as a young village development advisor in the Mekong Delta at the beginning of the Green Revolution.

In both Yuan Longping's hybrid rice and IR varieties (including the IR36 being perfected by Dr. Gurdev Khush, who would share the World Food Prize in 1996 with Dr. Henry "Hank" Beachell), the shorter growing period and increased grain production uplifted farmers and their families in several significant ways. First, some farmers could now plant two crops a year, each with a higher yield than traditional varieties. This in turn meant that they now had surplus rice to sell, with the additional income used to upgrade their family's housing, clothing, and other necessities. At the same time, this also gave them the opportunity to cultivate other, more nutritious secondary crops, like vegetables and melons.

These benefits of Yuan Longping's seeds, combined with other policies, began ineluctably to reduce the poverty ratio in China, which stood at 70 percent when I first visited in 1979. With the economic liberalisation introduced by Governor Xi Zhongxun in Guangdong province, the conversion of agricultural communes into individual family farms, and the expansion and improvement of rural road infrastructure, Yuan Longping's seeds spread rapidly across the country.

Internationally, especially under the leadership of M. S. Swaminathan, then Director General of IRRI, Yuan Longping's technology was integrated into research and introduced to other rice-growing countries.

Back in Hunan, Yuan Longping launched the next two phases of his career: carrying out the research and development of "super hybrid" seeds that would produce plants that would stand so tall and have panicles so filled with grain as to resemble a waterfall; and building a research centre and a team of professionals that would emulate IRRI. Over the next decades, the centre would attract scientists from over 50 countries.

It is estimated that half of all rice produced in China, and one-fifth of all rice grown globally, are Yuan Longping's hybrid varieties.

As a result of Yuan Longping's prodigious efforts and unrelenting determination, in 2004 he was chosen to receive the World Food Prize. At the Laureate Announcement at the U. S. State Department in Washington, U.S. Secretary of State Colin Powell lauded his accomplishments in countering hunger, and UN-FAO Director General Jacques Diouff noted how appropriate it was that this recognition and the recognition of the work of his co-laureate Dr. Monty Jones of Sierra Leone came during the International Year of Rice.

It was my privilege to preside at the ceremony in Des Moines, Iowa, at which Dr. Norman Borlaug presented the World Food Prize – the "Nobel Prize for Food and Agriculture" – to Professor Yuan Longping, as Dr. M.S. Swaminathan, the first World Food Prize Laureate, looked on. The three great leaders of the Green Revolution, the single greatest period of food production and hunger reduction in all human history, were together at this one time, at this one event.

As Vice Chairman of his International Rice Development Forum, I attended multiple symposia organized by Yuan Longping in China, and observed first-hand how his expertise and legend attracted increasing numbers of international participants. At his 90th birthday celebration in Changsha in 2019, I watched with fascination as Yuan Longping, like Borlaug and Swaminathan, still had the ability to enthral the attendees with his vision for how rice seeds with even greater productive capability could uplift Africa.

A few months later that year, the story of Yuan Longping's life and work had a poetic culmination. On the occasion of the 70th anniversary of the Communist Party's assuming state power, President Xi Jinping presented the Medal of the Republic – China's highest civilian honour – to just eight individuals. One of those most distinguished honourees, judged to have contributed magnificently to uplifting his fellow citizens, and eliminating hunger and poverty, was that young scientist who dreamed of rice plants overflowing with grain, and who had made his dreams come true – Yuan Longping.