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The Rice Breeder Who Fed Half the World

Life and Legacy of Dr. Gurdev Singh Khush

Born in a small village in Punjab, Dr. Gurdev Singh Khush became one of the world's most influential plant breeders, leaving an indelible mark on the history of food security. At the International Rice Research Institute (IRRI), he led the development of more than 300 rice varieties, including the landmark IR36 and IR64. Together, these varieties transformed rice production across much of the developing world, at one point covering more than 60 per cent of the global rice-growing area. Honoured with virtually every major international award in agricultural science, Dr. Khush chose to invest his prize money to agricultural education. His remarkable journey—from a Punjab village to the forefront of global rice science, stands as a powerful testament to scientific excellence guided by purpose, generosity, and humility.

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A Village Childhood, A Larger Purpose

Dr. Gurdev Singh Khush was born on 22 August 1935 in Rurkee, a small village in Jalandhar district of Punjab, into a farming family where agriculture was not simply a livelihood but a way of life. His father, Sardar Kartar Singh Kooner, believed that education was the most valuable inheritance he could give his children, while his mother instilled in him the values of honesty, perseverance, and compassion — qualities that would

remain with him throughout his long and distinguished scientific career.

Growing up on a farm, young Gurdev saw how a failed crop could bring hardship to a family and the entire community. Poor yields were not just numbers; they meant empty granaries and difficult times for families. In the Punjab of the 1940s, farmers depended largely on traditional varieties, uncertain rainfall, and manual labour. A poor monsoon could bring hardship to an entire village. These early

experiences stayed with him and gradually shaped the purpose that would guide his life: to use science to improve the lives of farmers and bring its benefits from the laboratory to the field.

An Education That Crossed Continents

Dr. Khush was an outstanding student from the start, topping his class at Khalsa High School before earning his Bachelor's degree in Agriculture in 1955 from the Government Agricultural College, Ludhiana — the institution that would later become Punjab Agricultural University. His growing interest in genetics took him to the University of California, Davis, where he completed his Ph.D. in Genetics under the renowned evolutionary biologist Professor G. Ledyard Stebbins. He continued at UC Davis as a postdoctoral researcher, working on tomato cytogenetics and genetic mapping under Professor Charles M. Rick, a leading scientist in the field. His work earned him an offer of a faculty position at UC Davis—an impressive opportunity for a young Indian scientist at the time. Yet, in 1967, Dr. Khush chose a different path. He left academic career in the United States to join the International Rice Research Institute (IRRI) in the Philippines, driven by a larger goal: to use genetics to help feed a growing world.

Building the Rice Varieties That Helped Feed a Growing World

At IRRI, Dr. Khush quickly understood that farmers needed more than high yields. They needed varieties that mature early, resist insects and diseases, perform well under adverse conditions, produce good-quality grain, and, most importantly, give more returns. This farmer-first approach shaped his research for decades. He soon became Head of the Plant Breeding Department, leading one of the most successful crop improvement programmes in agricultural history. Building on the earlier work of Dr. Henry Beachell, Dr. Khush and his team developed more than 300 improved rice varieties that transformed farming across Asia, Africa, and Latin America. Among them, IR36 was a landmark achievement. Released in the 1970s, it combined early maturity with resistance to several

major insect pests and diseases, giving farmers more stable and profitable harvests. At its peak, IR36 was grown on nearly 11 million hectares, making it one of the most widely cultivated food-crop varieties in history. Its successor, IR64, was equally influential. High-yielding, adaptable, and known for its excellent grain quality, it became a preferred rice variety across much of tropical Asia and was grown on more than 10 million hectares each year.

Together, the more than 300 varieties developed under Dr. Khush's leadership covered over 60 per cent of the world's rice-growing area during the Green Revolution. Many also became parents of new elite varieties developed in later years. During the same period, global paddy production rose from 257 million tonnes in 1966 to more than 700 million tonnes within a few decades. This remarkable increase helped avert widespread famine and strengthened food security for billions of people. Former IRRI Director General Dr. Ron Cantrell captured the magnitude of Dr. Khush's contribution in a memorable line: *"While Dr. Khush's name has passed the lips of many, his life's work has passed the lips of almost half of humanity."*

Recognition From Around the World

The recognition that followed reflected the extraordinary reach of Dr. Khush's work. Over the course of his career, he received the world's most prestigious honours in agriculture and science, including the Borlaug Award (1977), Japan Prize (1987), World Food Prize (1996, shared with Dr. Henry Beachell), Rank Prize (1998), Wolf Prize in Agriculture (2000), Padma Shri (2000), Swaminathan Award (2006), Golden Sickle Award (2007), Mahathir Science Award (2009), and the VinFuture Prize (2023). He received honorary doctorates from several leading universities, including the University of Cambridge, and was elected a Fellow of some of the world's most respected scientific academies, including the Royal Society of the United Kingdom, the US National Academy of Sciences, Indian National Science Academy, and Chinese Academy of Sciences. His expertise also took him beyond the laboratory, as he advised governments around the world on agricultural development and food security. Dr. Khush authored three books, more than 80 book chapters, and over 250 research papers, influencing generations of scientists around the world. He personally trained numerous rice breeders and served as a consultant to 15 national rice improvement programmes.

Dr. M. S. Swaminathan, widely regarded as the father



Dr. G.S. Khush during student life



of India's Green Revolution, captured Dr. Khush's stature as a scientist and mentor when he described him as one who "combines remarkable capacities in both theoretical and practical work" and is "a role model for all young scientists."

Giving Back: A Lasting Legacy

What makes Dr. Khush's story even more remarkable is what he chose to do with the recognition he received. Rather than keeping the prize money from his many international honours, he chose to invest it in agricultural education and research. In 2009, he donated approximately Rs 3.5 crore to Punjab Agricultural University to promote excellence in agricultural sciences. This generous contribution led to the establishment of the Dr. Gurdev Singh Khush Foundation for the Advancement of Agricultural Sciences in 2010.

Since its establishment, the Foundation has supported young researchers through distinguished lectures and has awarded 795 merit scholarships and more than 150 travel grants to help young scientists pursue research with global impact. It also recognises excellence through the Dr. Darshan Singh Brar Award in Agriculture, the Young Scientist Award, and the Excellence in Communication Award. In 2023, Punjab Agricultural University further honoured his legacy by establishing the Dr. Gurdev Singh Khush Institute of Genetics, Plant Breeding and Biotechnology, ensuring that his vision continues to

inspire and train future generations of scientists.

For a university that gave him his first degree, this act of giving back carries a special meaning. Decades after leaving Ludhiana for Davis and later Los Baños, Dr.

Khush chose to return a significant part of his success to the institution where his scientific journey began. It was more than an act of generosity; it was a lasting expression of gratitude, loyalty, and faith in the generations of scientists yet to come.

Conclusion

From a small village in Punjab to the forefront of global agricultural science, Dr.

Gurdev Singh Khush's journey reflects a life of scientific excellence and purposeful service. His rice varieties transformed the Green Revolution and strengthened food security for millions of people around the world. Yet his legacy extends beyond the varieties he bred and the honours he received. It lives on in the farmers he served, the scientists he

inspired, and the institutions he chose to nurture. His life is a lasting reminder that the finest science is science that serves people.

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