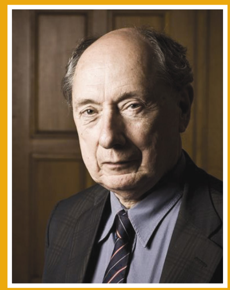
2013 WORLD FOOD PRIZE LAUREATES



MARC VAN MONTAGU
Belgium

MARY-DELL CHILTON
United States

ROBERT T. FRALEY
United States

Three distinguished scientists — **Marc Van Montagu** of Belgium, and **Mary-Dell Chilton** and **Robert T. Fraley** of the United States — will share the 2013 World Food Prize for their independent, individual breakthrough achievements in founding, developing, and applying modern agricultural biotechnology. Their research has made it possible for farmers to grow crops with resistance to insects and disease, tolerance to herbicides, and the ability to tolerate extreme variations in climate such as excessive heat and drought."

Building upon the scientific discovery of the Double Helix structure of DNA by Watson and Crick in the 1950s, Van Montagu, Chilton, and Fraley each conducted groundbreaking molecular research on how a plant bacterium could be adapted as a tool to insert genes from another organism into plant cells, which could produce new genetic lines with highly favorable traits. And, they are credited with developing the first transgenic plants.

The revolutionary biotechnology discoveries of these three individuals —each working in separate facilities on two continents—unlocked the key to plant cell transformation using recombinant DNA. Their work led to the development of a host of genetically enhanced crops that were grown on more than 170 million hectares around the globe by 17.3 million farmers in 2012. Over 90 percent of these were small resource-poor farmers in developing countries.

The combined achievements of the 2013 World Food Prize Laureates, from their work in the laboratory to applying biotechnology innovations in farmers' fields, have contributed significantly to increasing the quantity and availability of food, and can play a critical role as we face the global challenges of the 21st Century of producing more food, in a sustainable way, while confronting an increasingly volatile climate.

Marc Van Montagu

Born: 1933 in Ghent, Belgium
Education: Ph.D., Organic Chemistry/Biochemistry, Ghent University, 1965
Professional: Chairman of the Institute for Plant Biotechnology Outreach (IPBO), Ghent, Belgium

Marc Van Montagu grew up in Belgium during the Second World War, a time when food rationing and general hardships were common among most of the population. Despite his family's economic difficulties throughout the war and post-war period, they were able to send their only child to good primary and secondary schools. The excellent teachers in high school triggered Van Montagu's enthusiasm for organic chemistry and biology.

Later, as a student at Ghent University, he became intrigued with the new science of molecular biology, particularly the functions of DNA and RNA, which had recently been discovered to be present in all living organisms. Van Montagu's path of study and scientific experimentation culminating in a Ph.D. degree led to a permanent position with the Cell Biology Department at Ghent University Medical School, where he focused his research on RNA bacteriophages with his colleague Walter Fiers.

In the late 1960s , Van Montagu and his fellow researcher Jeff Schell (1935-2003) started working with the plant disease known as crown gall. They were the first to discover —in 1974— that Agrobacterium tumefaciens, the plant tumor-inducing soil microbe, carries a rather large circular molecule of DNA, which they named "Ti plasmid." They demonstrated that this plasmid is responsible for formation of the plant tumor. Later, they, and Mary-Dell Chilton working at the University of Washington, demonstrated that a segment of this plasmid, the T-DNA, is copied and transferred into the genome of the infected plant cell.

Van Montagu and Schell's elucidation of the structure and function of Ti plasmid led to their development of the first technology to stably transfer foreign genes into plants. This discovery galvanized the emerging molecular biology community, and set up a race to develop workable plant gene tools that could genetically engineer an array of plants and greatly enhance crop production worldwide. Their discovery was a breakthrough that provided scientists with an appropriate tool, or vector, to pursue complex biological questions in terms of specific genes, their structure, and the control of their expression in all aspects of plant biology.

Plant biotechnology as a new phenomenon rocketed to the forefront of the scientific world in 1983 when Van Montagu, Chilton, and Fraley each presented the results of their independent, pioneering research on the successful transfer of bacterial genes into plants and the creation of genetically modified plants at the Miami Biochemistry Winter Symposium: "Advances in Gene Technology."

Van Montagu went on to found two biotechnology companies: Plant Genetic Systems, best known for its early work on insect-resistant and herbicide tolerant crops, and Crop Design, a company focused on the genetic engineering of agronomic traits for the global commercial corn and rice seed markets.

In 2000, he also founded the Institute of Plant Biotechnology Outreach with the mission to assist developing countries in gaining access to the latest plant biotechnology developments and to stimulate their research institutions to become independent and competitive. Van Montagu remains a tireless, influential advocate for the transfer of plant biotechnology for the economic, environmental and health benefits of the emerging and developing nations.

Mary-Dell Chilton

Born: 1939 in Indianapolis, Indiana
Education: Ph.D., Chemistry, University of Illinois, 1967
Professional: Founder and Distinguished Science Fellow, Syngenta Biotechnology, Inc.

Mary-Dell Chilton's family moved from Elgin, Illinois to the nearby town of Hinsdale when she was entering the 7th grade so that she could attend a better school system that offered college-preparatory courses. In junior high and high school, she took her first Biology class, surprised her teachers by scoring extremely high on a national science exam, decided to concentrate her educational goals on math and science, and became an amateur telescope maker who was deeply interested in optics.

In college, Chilton was drawn to studying the chemical basis of biological specificity, where she found lots of questions with no answers – and therefore lots of room for discovery. The direction of her life's work in molecular genetics and plant biotechnology became clear while she pursued her Ph.D. in chemistry at the University of Illinois.

The Double Helix structure of DNA fascinated her, and, after doing her doctoral thesis on bacterial transformation, showing that both strands of the Helix can "fix" a cell, she accepted a postdoctoral position in microbiology at the University of Washington (UW) in Seattle. It was there that she learned DNA hybridization technology, a collection of tools that served her well in her next undertaking, a study of how Agrobacterium causes plant cells to grow into a gall.

In the race to build upon the work of Marc Van Montagu and Jeff Schell, Chilton and two colleagues at UW—Milton Gordon (now deceased) and Eugene Nester—made the breakthrough discovery that the crown gall tumors of plants are caused by the transfer of only a small piece of DNA from the Ti plasmid (T-DNA) in Agrobacterium tumefaciens into the host plant, where it becomes part of the plant's genome.

Chilton continued her molecular biology research after going to Washington University in St. Louis, accepting a faculty position there in 1979. Three years later, her team harnessed the gene-transfer mechanism of Agrobacterium to produce the first transgenic tobacco plant, and she reported these startling findings at the 1983 Miami Winter Biochemistry Symposium. Chilton's work demonstrated that T-DNA can be used to transfer genes from other organisms into higher plants. Thus, her work provided evidence that plant genomes could be manipulated in a much more precise fashion than was possible using traditional plant breeding.

Chilton was hired by Ciba-Geigy Corporation (later Syngenta Biotechnology, Inc., or SBI) at Research Triangle Park in North Carolina in 1983 and began the next phase of her career, spanning both biotechnology research and administrative roles including Vice President of Agricultural Biotechnology, Distinguished Science Fellow, and Principal Scientist.

Chilton established one of the world's first industrial agricultural biotechnology programs at Ciba-Geigy where she led applied research in areas such as disease resistance and insect resistance, as well as continuing to improve transformation systems in crop plants. She has spent the last three decades overseeing the implementation of the technology she developed and further improving it to be used in the introduction of new and novel genes into plants.

Robert T. Fraley

Born: 1953 in Wellington, Illinois
Education: Ph.D., Microbiology/Biochemistry, University of Illinois, 1978
Professional: Executive Vice President and Chief Technology Officer, Monsanto

Robert Fraley's passion for helping farmers grow better and higher yielding crops was shaped by his experience growing up on a small Midwestern farm that produced grains and livestock. As a child exploring the world around him in rural Illinois, his interest in the scientific complexities of living organisms developed very early and blossomed during his undergraduate education and graduate training in microbiology and biochemistry at the University of Illinois and in his post-doctoral research in biophysics at the University of California-San Francisco.

Hired by Monsanto in 1981 as a research specialist, Fraley led a plant molecular biology group that worked on developing better crops through genetic engineering—to give farmers real solutions to critical problems such as the pest and weed infestations that frequently destroyed crops. His early research built upon the discoveries of Mary-Dell Chilton and Marc Van Montagu as he focused on inventing effective methods for gene transfer systems.

A breakthrough occurred when Fraley and his team isolated a bacterial marker gene and engineered it to express in plant cells. By inserting that gene into Agrobacterium, they were able to transfer an immunity trait into petunia and tobacco cells. Fraley and his team produced the first transgenic plants using the Agrobacterium transformation process, and presented these findings at the Miami Biochemistry Winter Symposium.

Coming from a farm, Fraley could see the potential that this emerging science offered to farmers across many countries, many crops, and farms of all sizes. To better understand farmers' needs regarding the application of biotechnology to agriculture, he often went out into fields to observe local agronomic practices and talk with farmers to ensure that they would be offered solutions that worked better than any alternatives.

With his team of researchers, Fraley developed more elaborate plant transformations of an array of crops, which has led to the widespread accessibility of farmers across the globe to genetically modified seeds with resistance to insect and weed pests, and with tolerance to changes in climate such as excessive heat and drought. Plant breeders now have the ability to understand the genetic composition of every seed, and farmers have more tools than ever before to ensure that they can grow higher yielding crops.

In 1996, Fraley led the successful introduction of genetically engineered soybeans that were resistant to the herbicide glyphosate, commercially known as Roundup. When planting these "Roundup Ready" crops, a farmer was able to spray an entire field with glyphosate—and only the weeds would be eliminated, leaving the crop plants alive and thriving.

In leadership positions at Monsanto—currently as Executive Vice President and Chief Technology Officer—Fraley has played a key role in the company's choice of research directions that led to viable finished products, and the technical and business strategy that ensured wide availability and benefit to farmers of all sizes around the world. He has especially championed smallholder accessibility to biotechnology.

THE IMPACT OF BIOTECHNOLOGY

The pioneering work of Marc Van Montagu, Mary-Dell Chilton, and Robert Fraley contributed to the emergence of a new term, "agricultural biotechnology," and set the stage for engineering crops with novel traits that improved yields and conferred resistance to insects and disease, as well as tolerance to adverse environmental conditions. Their work has made it possible for farmers in 30 countries to improve the yield of their crops to feed a growing global population.

Beginning with the first cultivation of staple transgenic crops in 1996 until the present, biotech crops have contributed to food security and sustainability by increasing crop production valued at US $98.2 billion and providing a better environment by reducing the application of significant amounts of pesticides worldwide. Today, more than 12 percent of the world's arable land is planted with biotechnology crops.

There have been dramatic increases in the total acreage planted. Canola, cotton, corn and soybeans are the major biotech crops grown commercially on a large scale and have become an integral part of international agriculture production and trade. At the same time, a wide variety of useful genes have been transformed into a large number of economically important plants, including most of the food crops, scores of varieties of fruits and vegetables, and many tree species.

According to a recent report by ISAAA (International Service for the Acquisition of Agri-biotech Applications), 2012 marks the first year since the introduction of biotech crops in 1996 that developing countries grew more biotech crops than industrial countries. This is contributing to enhanced food security and poverty reduction in some of the world's most vulnerable regions. "In the period 1996 to 2012, millions of farmers in 30 countries planted an accumulated hectarage of more than 1.5 billion hectares."

A record 17.3 million farmers grew biotech crops worldwide in 2012, up 0.6 million from a year earlier. Over 90 percent of these were small resource-poor farmers in developing countries. From 1996 to 2011, poverty was alleviated for more than 15 million small holder farmers and their families, totaling approximately 50 million people, through their planting and harvesting of biotech crops. During this period, according to the ISAAA report, 328 million tons of additional food, feed and fiber was produced worldwide by biotech crops.

As the world grapples with how to feed the estimated 9 billion people who will inhabit the planet by the year 2050, it will be critical to build upon the advanced agricultural discoveries of the 2013 World Food Prize Laureates to further additional scientific advancements.

Marc Van Montagu, Mary-Dell Chilton and Robert T. Fraley will be presented the $250,000 World Food Prize on October 17 at the Iowa State Capitol in Des Moines.

The award will be given in conjunction with the 2013 Borlaug Dialogue, themed ***The Next Borlaug Century: Biotechnology, Sustainability and Climate Volatility***

The World Food Prize was created by Dr. Norman E. Borlaug, recipient of the 1970 Nobel Peace Prize. Since 1986, The World Food Prize has honored outstanding individuals who have made vital contributions to improving the quality, quantity, or availability of food throughout the world. In 1990, when the original sponsor withdrew, Des Moines businessman and philanthropist John Ruan assumed sponsorship of The Prize and relocated The World Food Prize Foundation to Des Moines, Iowa, USA.

Previous Laureates have been recognized from Bangladesh, Brazil, China, Cuba, Denmark, Ethiopia, India, Mexico, Sierra Leone, Switzerland, the United Kingdom, the United Nations, and the United States.