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## PAMELA RONALD: TOMORROW'S TABLE: ORGANIC FARMING, GENETICS AND THE FUTURE OF FOOD

[I. Sustainable Agriculture](#)

II. Engineering Resistance to Bacterial Infection and Tolerance to Environmental Stresses

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### Part II: Engineering Resistance to Bacterial Infection and Tolerance to Environmental Stresses

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#### Lecture Overview

In her lecture, Ronald emphasizes the importance of developing sustainable agricultural practices that will allow the world's population to be fed without destroying the Earth. Ronald demonstrates that modern genetics approaches have facilitated development of new crop varieties that can increase crop yields while reducing insecticide use. She proposes that the judicious incorporation of two important strands of agriculture—agricultural biotechnology and agroecological practices—is key to helping feed the growing population and she provides compelling examples to support her stand.

In Part 2, Ronald discusses one of the greatest challenges of our time: how to feed the growing population in the presence of disease and environmental stresses that threaten the world's crops. Currently, twenty-five percent of the world's rice is grown in flood prone areas. Ronald and her colleagues characterized a gene, Sub1A, that confers tolerance to two weeks of flooding. They demonstrate that transferring Sub1A to a highly intolerant rice species is sufficient for the crop to tolerate submergence in water. Ronald shifts gears to discuss another gene, Xa21, that she and her colleagues discovered that controls the rice immune response. Ronald hypothesizes that Xa21 is activated by a sulfated peptides derived from the infecting bacteria.

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### Speaker Bio

Pamela Ronald is Professor of Plant Pathology at the University of California, Davis, where she studies the role that genes play in a plant's response to its environment. Her laboratory has genetically engineered rice for resistance to diseases and flooding, both of which are serious problems of rice crops in Asia and Africa. She also serves as Vice President for the Feedstocks Division and Director of Grass Genetics at the Joint Bioenergy Institute.

Ronald received a B.A. from Reed College, an M.A. from Stanford University, an M.S. from the University of Uppsala in Sweden and her Ph.D. from UC Berkeley in 1985. She was a postdoctoral fellow at Cornell University from 1990-1992. In 1992, Ronald joined UC Davis as a faculty member. Ronald and her colleagues are the recipients of numerous awards including the USDA 2008 National Research Initiative Discovery Award for their work on submergence tolerant rice. Ronald was awarded a Guggenheim Fellowship, the Fulbright-Tocqueville Distinguished Chair and the National Association of Science Writers Science in Society Journalism Award. She is an elected fellow of the American Association for the Advancement of Science. In 2011, she was selected as one of the 100 most creative people in business by Fast Company Magazine. In 2012, Ronald was awarded the Louis Malassis International Scientific Prize for Agriculture and Food and the Tech Award for innovative use of technology to benefit humanity.

Ronald has also received acclaim for "Tomorrow's Table: Organic Farming, Genetic and the Future of Food" a book she co-authored with her husband, Raoul Adamchak, an organic farmer. Bill Gates calls the book "a fantastic piece of work" and "important for anyone that wants to learn about the science of seeds and challenges faced by farmers".

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### Related Articles

#### Books

Ronald PC and Adamchak RW (2008) Tomorrow's Table. Organic Farming, Genetics and the Future of Food. Oxford University Press

#### Articles

##### Part 1

N. V. Fedoroff, D. S. Battisti, R. N. Beachy, Cooper, A. Fischhoff, N. Hodges, V. Knauf, D. Lobell, B. J. Mazur, D. Molden, M. P. Reynolds, P. C. Ronald, M. W. Rosegrant, P. A. Sanchez, A. Vonshak, J.-K. Zhu. 2010. Radically Rethinking Agriculture for the 21st Century. Science 327: 833-4

Ronald P. 2008. The new organic: The future of food may depend on an unlikely marriage: organic farmers and genetic engineering. The Boston Globe, March 16, 2008.

##### Part 2

Ronald PC and Beutler B. (2010) Plant and Animal Sensors of Conserved Microbial Signatures. Science 330: 061-1064.

Park CJ, Han SW, Chen X, Ronald PC. (2010) Elucidation of XA21-mediated innate immunity. Cell Microbiol.12:1017-25.

Lee SW, Han SW, Sririyanum M, Park CJ, Seo YS, Ronald PC. (2009) A type I-secreted, sulfated peptide triggers XA21-mediated innate immunity. Science. 326:850-3.

Jung K, An G and Ronald P. (2008). Towards A Better Bowl of Rice: Assigning biological function to 60,000 rice genes. Nature Reviews Genetics. 9:91-101.

Xu K, Xu X, Fukao T, Canlas P, Heuer S, Bailey-Serres J, Ismail A, Ronald P, Mackill D. 2006. Sub1A encodes an ethylene responsive-like factor that confers submergence tolerance to rice. Nature. 442. 705-708

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