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## Can Plant Genetics Help Solve World Hunger? Science Says Yes



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**UC Contributor, UC**

By *Jessica Dineen*

When it comes to the earth's dwindling resources, climbing temperatures and burgeoning population, talk is as plentiful as it is cheap. It can also be contentious. But Dr. Pamela Ronald, professor of plant pathology at [University of California, Davis](#), doesn't have time for controversy. She's too busy working toward an unassailable goal. "I'm focused on the greatest challenge of our time," Ronald says, "which is how to feed the growing population without further destroying the environment."

To that end, Ronald has made history. Twenty years ago, she and her colleagues at UC Davis isolated the plant-disease-battling Xa21 gene, found on the 11<sup>th</sup> chromosome of rice. The potential of this feat of genetic engineering was great; rice is relied upon to feed half the world. *The New York Times* [heralded it](#) a new agricultural era.



It's an era Ronald has continued to help define. In 2006, she worked with David Mackill and Kenong Xu at IRRI to isolate the rice gene [Submergence Tolerance 1 QTL](#), dubbed "Sub1." Found in an ancient variety of rice, the Sub1 gene confers a flood tolerance trait to rice plants, allowing them to survive for up to two weeks underwater. A conventional rice plant will last only three or four days.

The following year, reporters from *National Public Radio* visited a village in northern Bangladesh after Monsoon flooding. Only one farmer, Gobindra Chandra Rai, had planted government-provided Sub1 seedlings developed by the [International Rice Research Institute](#) using precision breeding. The reporters encountered swaths of drowned plants surrounding Chandra Rai's plot of healthy, green stalks. Villagers crowded around, admiring the crop's success. When asked which farmers would plant Sub1 rice in the future, Chandra Rai exclaimed, "Everybody." Last year, 3.5 million farmers in Asia were planting Sub1 rice.

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### Standing Up for Science

In some circles, work such as Ronald's is regarded as nearly heroic. In other circles, plant genetics garners more misgivings than accolades. When "golden rice," engineered with Vitamin A to prevent starvation and blindness, was field-tested in the Philippines in 2013, protesters ripped up the plants. *The New York Times* reported that crops with similarly benign aims were being destroyed around the world, such as grapes imbued with anti-viral properties in France.

Ronald contends that the public would be less fearful if the conversation about genetically modified crops remained grounded in science. "Many people don't realize almost everything we eat is genetically modified in some way," she says, explaining that there are many methods of altering food, some used throughout the history of farming. "Almost nothing we eat would survive in nature. It's a domesticated system."

Ronald notes that genetically engineered crops are deemed safe by widely respected organizations such as the [National Academy of Sciences](#) and the [American Association for the Advancement of Science](#). Genetically engineered crops also get a nod for offering environmental advantages. A [report](#) issued last year by the U.S. Department of Agriculture found less insecticide use among farmers planting Bt cotton, genetically engineered for pest resistance. "In the scientific community," Ronald asserts, "the conclusion that modern genetic methods are no more risky than conventional methods, is accepted."

The secret to assuaging fear, Ronald supposes, may be to fill out the picture "with the nitty gritty of a particular farm and a particular crop and a particular consumer."

"There's a lack of imagination among the public in the developed world," she laments. "It's hard for people to really understand that children are dying because they don't have vitamin A."

### The Future of Farming

If anyone can help the public navigate the intersection of genetics, food and good health, it's Pamela Ronald. While scientists worldwide are attempting to move genes from one species to another to confer various beneficial traits, Ronald may be singularly devoted to a holistic brand of sustainable agriculture. She is married to [Raoul Adamchak](#), an organic farmer also working out of UC Davis. In 2010, they co-authored "[Tomorrow's Table: Organic Farming, Genetics, and the Future of Food](#)," which describes the importance of ecologically based farming practices and genetically improved seed to sustainable agriculture.

If the couple's own progeny is a harbinger of things to come, the outlook is good for scientific ingenuity. While shopping recently, Ronald and her 13-year-old daughter came across a new kind of frankenfood, a tomato fused with a potato, called a [TomTato](#). Ronald's daughter exclaimed, "Neat, how do they do that?" Ronald described grafting. Her daughter replied, "That sounds like a lot of work. Let me know when I can get it in the seed."

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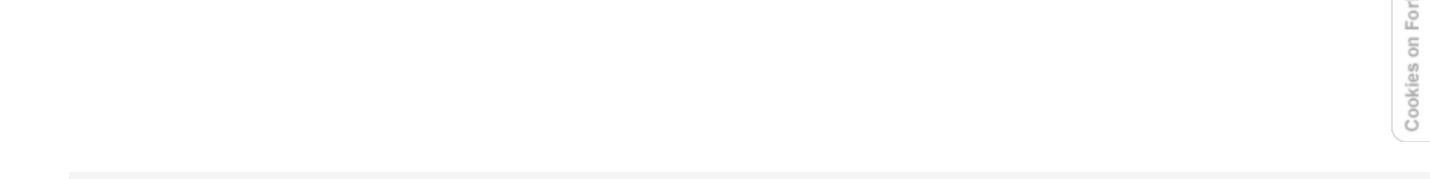
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