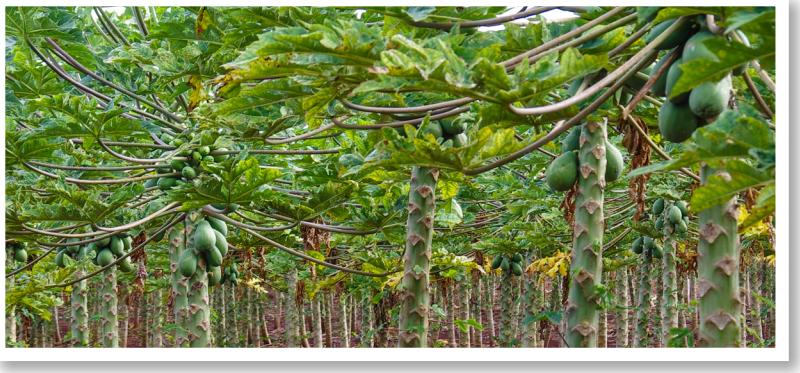
Cooperative Extension Service
Biotechnology Outreach Program
College of Tropical Agriculture and Human Resources
University of Hawai'i at Manoa

Biotech In focus

April 2015 Issue 29

GMOs on Hawaii island, part 1: Neighbors square off over papaya, taro, and coffee

The island of Hawaii, (the Big Island) is not a center of Hawaii's seed corn industry. However, as we will explore in our next two bulletins, the Big Island is no stranger to controversies related to the farming of genetically modified (GM) crops.



The Big Island is home to more than 80 percent of the state's papaya acreage (mostly in the Puna area). More than 75 percent of the papayas grown in Hawaii are genetically engineered to resist papaya ringspot virus. The GM 'Rainbow' and 'SunUp' papayas, developed by the University of Hawaii (UH) and Cornell University, and not by the seed industry, were first released to farmers in 1998.

This release brought attention to University of Hawaii's biotechnology research activities. Concerns were raised that genetic modification could have unintended impacts on consumers, growers of non-GM crops, and the reputation of iconic products like coffee from Hawaii, and crops with cultural significance, such as taro. These concerns led to efforts to have the Hawaii County Council limit and regulate the farming of GM crops.

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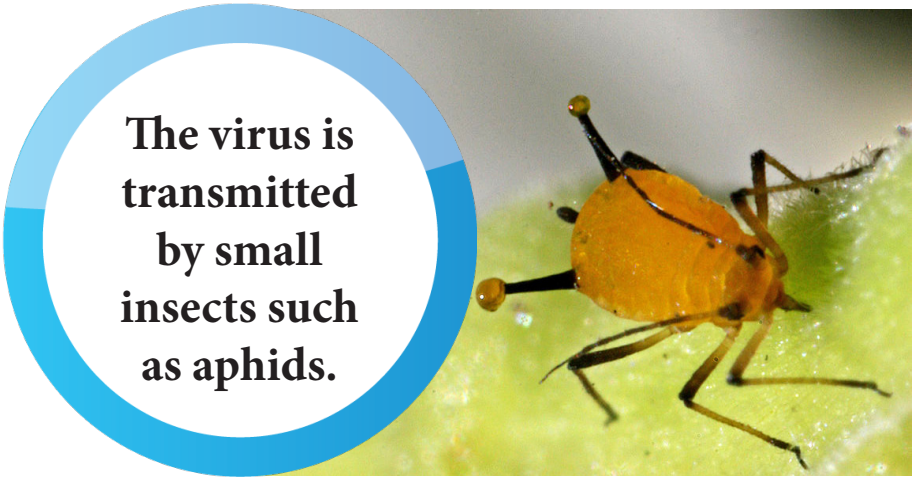
Thank you to Carol Oshiro for web design, Jessica Radovich for graphics and Kathleen Vickers for text editing.

Ringspot Resistance

GM papaya produces a ringspot virus protein that, like a vaccine, activates the plant's defenses and provides disease resistance, specifically to Papaya Ringspot Virus. The new papaya varieties, 'SunUp', and especially 'Rainbow', rapidly gained popularity with Puna district farmers. Some farmers grew both GM and non-GM papaya, using the virus-resistant GM papaya to make barriers to protect susceptible non-GM papaya from the ringspot virus. The virus is transmitted from plant to plant by small insects, various species of aphids. The resulting non-GM papayas then met requirements for export to Japan after further testing. Until recently, Japan did not allow the importation of GM papaya.

A non-GM papaya variety with ringspot virus



The virus is transmitted by small insects such as aphids.

Uncertain Results

The transgenic GM papayas worked very well, and are credited with saving the Hawaii papaya industry. However, in 2004, the Hawaii Genetic Engineering Action Network, which was very active ten years ago, reported "50 percent GMO contamination" in Big Island papaya seeds collected from organic farms, yards, and roadside trees. The uncertainties regarding how the samples were taken and the testing procedures used, made these results very difficult to repeat or interpret.

Ensuring Self-Pollination

UH advised commercial and backyard growers that non-GM seeds could be produced by bagging the flowers of non-GM hermaphroditic plants (whose flowers contain both male and female parts) to ensure self-pollination. According to USDA Organic Standards, unintended cross-pollination is not sufficient cause for loss of organic certification. However, some organic farmers felt ethically obliged to destroy trees that may have been pollinated by GM plants, despite the fact that pollination has no long-term impact on the plants. Thus, while many Big Island papaya producers came to rely on GM papaya for their livelihoods, others considered GM papaya a greater threat to their farms than the ringspot virus.

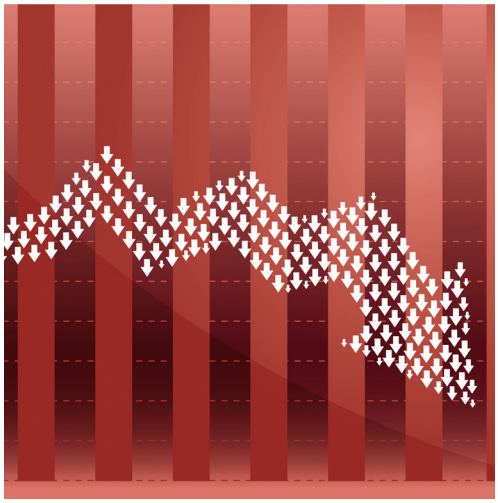
Pursuit of Blight Resistant Taro Ends

DNA technology again took the spotlight in 2005, amid complaints that a UH researcher working on the Big Island had introduced a wheat gene into a Chinese taro variety to engineer resistance to the Phytophthora pathogen that causes taro leaf blight. Taro (kalo) in Hawaii is traditionally honored as the older brother of the Hawaiian people and has great cultural significance. UH Manoa's College of Tropical Agriculture and Human Resources agreed not to pursue genetic engineering of Hawaiian taro varieties. The GM Chinese taro was never grown outside the greenhouse, and the project ended when it's funding ended.

GM Taro & Coffee Banned

In September 2008, Hawaii County Council Vice Chair Angel Pilago introduced Bill 361, that would make it illegal to "test, propagate, cultivate, raise, plant, grow, introduce or release" GM taro or coffee. The penalty for violation of the ban initially included up to a year in jail, a maximum fine of $1,000, or both. The bill was subsequently amended to remove the jail provisions.

Arguing VS Bill 361



Testimony for and against the ban both invoked a decade of commercial GM papaya farming. Opponents of the Bill 361 argued that without virus-resistant GM papaya, the papaya industry would have been lost.

Fewer Alternatives

It was pointed out that if coffee and taro producers someday faced a similar disease situation, and if genetic engineering research on those crops was prohibited, there would be fewer alternatives for these crops if devastating plant pathogens became introduced to Hawaii.

Preventive Measure

Supporters of the Bill noted the desire of some local consumers and foreign markets to avoid GM products that they believed had helped diminish the value of Hawaii papayas. The supporters of the bill proposed that the ban would prevent comparable damage to the image of Hawaii's coffee and taro.

Bill 361 passed the County Council by a unanimous vote. After the mayor's subsequent veto was overridden, Bill 361 became Ordinance 154 in November 2008. In our next bulletin, we'll look at the County Council's most recent passage of a more recent sweeping GMO ban and update readers on the current status of court challenges to that law.

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