

A close-up photograph of a green papaya leaf, showing its intricate vein structure and several glistening water droplets. The leaf is the central focus of the background.

# PAPAYA

THE FAILURE OF GE PAPAYA IN HAWAII

BRIEFING 2006

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**GREENPEACE**

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Summary	3
I AN AILING INDUSTRY: STATISTICS SHOW THE DECLINE OF PAPAYA FARMING IN HAWAII	4
II THE BURDEN ON ORGANIC PAPAYA FARMERS	8
III A REPUTATION AT RISK: THE UNIVERSITY OF HAWAII'S COLLEGE OF TROPICAL AGRICULTURE	9
IV THE ILLUSION OF SUCCESS, BUT THE REALITY A DISASTER	10

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## Summary

The ringspot virus-resistant genetically engineered (GE) papaya introduced in Hawaii in 1998 has been a commercial failure that has propelled the Islands' papaya industry towards collapse.

Fewer papayas are harvested in Hawaii now than at any time in more than a generation, fewer also than during the years when the outbreak of papaya ringspot virus was at its worst. The gross value of Hawaii's fresh papaya crop was higher in 1997, the last year of non-GE production, than it has been in each and every year since.

Since 1998, US citizens have doubled their average consumption of fresh papayas. Yet in Hawaii, the total area of papayas harvested is now less than 600 hectares, a decline of 28% since the GE papaya was introduced. Ten and twenty years ago, nearly twice the amount of acreage was harvested. On average, farmers now receive 35% less per kilogram for their fruit than they did before the GE papaya was released.

Despite these grim statistics from the US Department of Agriculture (USDA), the genetic engineering industry and its allies insist that the GE papaya has been a success. The American Farm Bureau says that it is "*a dramatic success for biotechnology*"<sup>1</sup> that, Monsanto proclaims, "*is credited with saving Hawaii's papaya industry.*"<sup>2</sup>

In reality, genetic engineering has not saved an industry - it has accelerated the decline of Hawaiian papayas. While other market factors have to be taken into account as well, the introduction of GE papaya poses a significant and unique market disadvantage and certainly hasn't saved the Hawaiian industry. Arguably, the only real beneficiaries of the GE papaya in Hawaii are a few large companies in a concentrated industry that frequently relies on tenant farmers who don't own the land that they work.

For organic farmers, GE papayas have been a source of problems. The burden of defending against contamination from GE papaya pollen has been unfairly foisted upon those who seek to produce papayas most sustainably.

The truth about the failures in Hawaii is especially important because of the pressure that the US is exerting on other countries, especially in Southeast Asia, to permit GE papaya on their land. GE papaya promoters such as the United States Agency for International Development (USAID) and the genetic engineering industry association the International Service for the Acquisition of Agri-biotech Applications (ISAAA) claim that it has been a success and, based upon that dubious assertion, they urge countries such as Thailand, the Philippines, and Indonesia to open their farms to the genetically engineered fruit.

Yet the 'success' of the GE papaya is largely a fiction dreamed up and promoted by its inventors and by a few large Hawaiian Papaya businesses that have trapped themselves in a cycle of genetic engineering use. If they do not succeed in convincing Asian countries to plant and eat the GE papaya, then the Hawaiian industry will likely continue to spiral downward - a collapse being caused by its own self-inflicted GE experiment. This is due to almost universal consumer and market rejection, with a clear preference for non-GE and organic papaya. There is also, sensibly, no regulatory approval for GE papaya import to key markets, e.g. Japan & the 25 countries of the EU.

Hawaii's papaya industry has a product that consumers do not want and also has strong competition from papaya producing countries in South East Asia or Latin America. Mexican papaya, for example, is more widely consumed in mainland USA than the Hawaiian one.

1 | Truelsen, J. 2003. Biotechnology saves Hawaii papaya industry. *American Farm Bureau News*, 26 May 2003. <http://www.fb.org/news/fbn/html/biotechnology.html>

2 | Monsanto. Monsanto Hawaii: Agricultural Biotech in the Islands. [http://www.monsanto.com/monsanto/layout/about\\_us/locations/us/hawaii/agr\\_biotech.asp](http://www.monsanto.com/monsanto/layout/about_us/locations/us/hawaii/agr_biotech.asp), accessed 17 January 2006.

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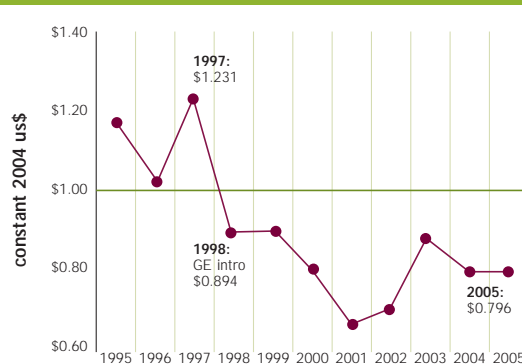
### I AN AILING INDUSTRY: STATISTICS SHOW THE DECLINE OF PAPAYA FARMING IN HAWAII<sup>3</sup>

Major indicators on the Hawaiian papaya crop have all been in decline since GE fruit first came to market in 1998. A decade ago in 1995, the gross value of Hawaii's fresh papaya crop was over US \$22m (adjusted for inflation). Today, it has declined by more than half. In 2005, its value was just \$10.9 million.

While the market for agricultural products is influenced by factors such as weather, distance to markets and price issues, the Hawaiian production of GE papaya poses a significant, unique disadvantage on export markets.

In 1997, before ringspot virus-resistant GE papayas were sold, farmers received an average of US \$1.23 per kilogram. In 1998, that figure immediately crashed to \$0.89 when traditional buyers of Hawaiian papayas, such as Japan and Canada, rejected the GE fruit. Hawaiian papaya exports to Japan fell from \$10.3 million in 1998 to \$4.6 million in 2005.<sup>4</sup> Despite Canada's approval of the GE fruit in 2003, the price has never recovered. For the past two years (2004-05), it has averaged less than \$0.80 per kilo, at or only marginally above the production cost for many farmers.

FIGURE 1: HAWAIIAN FRESH PAPAYA, AVERAGE PRICE PER KG. PRICES AFTER 1998 INCLUDE NON-GE PREMIUMS BECAUSE USDA DOES NOT DISAGGREGATE THE NUMBERS. THUS, THE ADDED VALUE OF THE NON-GE AND ORGANIC PRODUCTION IS MASKING AN EVEN LOWER MARKET PRICE OF GE PAPAYA



3 | Except where noted, all statistics used in this section are from the US Department of Agriculture Economic Research Service. *Fruit and Tree Nuts Outlook and Situation Yearbook*, October 2005. Statistics for 2005 are from the US Department of Agriculture National Agricultural Statistics Service. *Noncitrus Fruit and Nuts 2005 Preliminary Summary*, January 2006. Conversions to constant 2004 US dollars were performed using the US Bureau of Labor Statistics Producer Price Index for Fresh Fruits & Melons (Series ID WPU0111). Dollar figures for 2005 are unadjusted.

4 | Foreign Trade Zone Division of the state Department of Business, Economic Development and Tourism (DEBDT). Cited in Hao, S. 2006. Papaya production taking a tumble. *The Honolulu Advertiser*, March 19, 2006. <http://the.honoluluadvertiser.com/article/2006/Mar/19/bz/FP603190311.html>



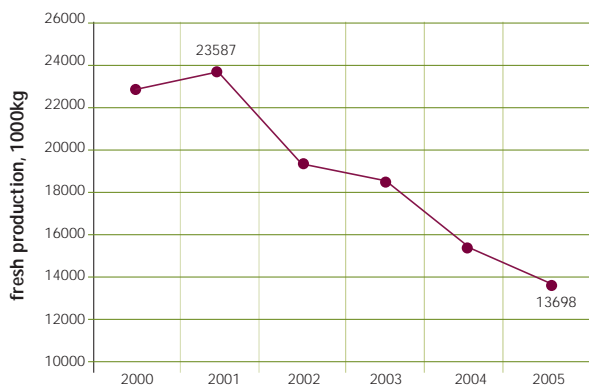
© GP/INAI DITTAJOHN

Hawaii's peak production of papayas occurred more than two decades ago in 1984, when over 30 million kilograms were produced. In 1992, papaya ringspot virus appeared on the Big Island Hawaii; but production still averaged over 19 million kilos per year in the mid-90s. In 1998-99, before the market rejection of the GE papaya was clear, a surge in planting of GE varieties boosted harvests to 23.6 million kg in 2001. But, with prices for the GE fruit in a tailspin, the increased production did not translate into farm income because the kilo price had fallen 46%, from US \$1.23 to \$0.66.

Since 2001, production has been in a freefall. In 2004, the harvest dropped to 15.5 million kilos, less than it was in the mid-1990s, when the outbreak of papaya ringspot virus was at its worst. In 2005 the harvest tumbled again, falling another 12%. Only 13.6 million kilos of papaya were harvested in 2005, the lowest level in more than a generation.

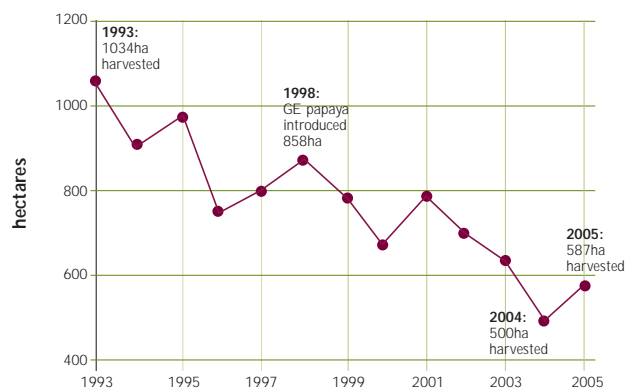
At the same time, other papaya producing and exporting countries, such as Mexico or Brazil, showed steady increases in production over the same period of time.

**FIGURE 2: PRODUCTION IN DECLINE 2000 - 2005**



As prices and production have declined, so has the area cultivated. Proponents of GE papaya frequently cite the statistic that about 60% of Hawaii's papayas are GE. But 60% of what? In 2004, only 500 hectares were harvested, 42% less than 1998 and a smaller area than any year since before 1979. In 2005, papaya acreage staged a modest comeback, expanding to 587 hectares, however, production stayed on the decline.

**FIGURE 3: HAWAII PAPAYA FARMS ON THE DECLINE**

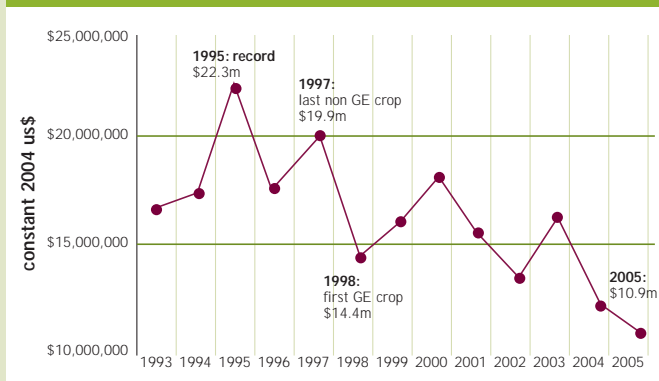


# PAPAYA

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Estimates of the number of Hawaiian papaya farmers vary considerably. The Hawaii Papaya Industry Association (HPIA), a pro-GE lobby group headed by the manager of one of the Islands' biggest papaya companies, says that there are 350 farmers.<sup>5</sup> According to the National Agricultural Statistics, however, the number of papaya farmers went down from 262 in 1998 to just 205 in 2005.<sup>6</sup>

**FIGURE 4: GROSS VALUE OF FRESH HAWAIIAN PAPAYA CROP**  
(HECTARES OF UTILIZED FRESH PAPAYA X AVERAGE FRESH PRICE)



The alleged 'success' of the GE papaya gets even worse. Since GE papayas went on sale in 1998, the Hawaiian market has been divided into three basic segments: GE papaya, organic papaya, and conventional papayas that are neither GE nor organic.

Conventional and, especially, organic papayas are worth more at market, and receive a price premium over the lower-value GE fruit. Depending on the fruit and the day, this premium ranges from several cents per kilo to triple the price of GE fruit. For example, at a retail farmers market in Maui in November 2005, organic papayas fetched US \$3.20 per kilo, versus \$0.99 for the GE fruit. Much of Hawaii's conventional (non-GE) fruit is sold in Japan.

In its recordkeeping, however, the US Department of Agriculture does not separate the different prices for the three kinds of fruit. Thus, the actual market performance of the GE fruit is even poorer than the statistics indicate, because they include the higher price premiums paid for non-GE fruit, especially organic fruit, which is much more valuable than GE. In other words, the bunched statistics disguise an even lower average price for GE fruit.

GE papaya from Hawaii has not even succeeded in the US. Hawaii is the only US state with commercial papaya production and there are no restrictions to the sale of GE papayas in the US, where, although many consumers seek to avoid them, GE foods are not labeled. In the same period since the introduction of the GE papaya American per capita consumption of papayas has doubled.

5 | Mochida, L. 2005. Comments in Response to the Notice of Availability of Certain Ethylenebisdithiocarbamates (EBDCs) and Ethylene Thiourea (ETU); Risk Assessments and Preliminary Risk Reduction Options. Hawaii Papaya Industry Association, letter to the US Environmental Protection Agency, 4 February 2005. <http://www.wrpmc.ucdavis.edu/NewsAlerts/hawaiipapayaindustry.html>

6 | Hawaii Agricultural Statistics Service. Cited in Hao, S. 2006. Papaya production taking a tumble. *The Honolulu Advertiser*, March 19, 2006. <http://the.honoluluadvertiser.com/article/2006/Mar/19/bz/FP603190311.html>

Yet while Americans are eating more and more fresh papayas, Hawaii's industry is getting smaller and smaller. Why? The papayas that Americans are eating don't come from Hawaii. The vast majority are from Mexico, Central America, and the Caribbean and they are not genetically engineered. Over 126 million kilos were imported in 2004, more than eight times Hawaii's production.

Fundamentally, the export market for Hawaii's papayas is on the US mainland and mainly focused on a few cities on the west coast, such as Los Angeles and San Francisco. There, Hawaiian organic papayas enjoy a healthy market amongst the many health-conscious consumers. GE papayas, however, have no strong selling point. Quite the contrary, with health conscious consumers and the food producers and retailers who cater to them clearly more likely to avoid the GE fruit. Promotion of sustainable organically produced papaya would appear to provide a much better chance of gaining market share and saving Hawaii's papaya industry than any GE experiment.

Hawaii's unenviable position as the world's only producer of GE papayas makes it in Hawaii's interest to convince countries outside the US to cultivate the GE fruit so that its own current market disadvantage is reduced.



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### II THE BURDEN ON ORGANIC PAPAYA FARMERS

The papaya ring spot virus is mostly a problem for production under large-scale, concentrated conditions. Smaller holdings and mixed systems on organic farms make the virus less likely to spread and outbreaks less damaging. Nevertheless, an important part of the damage done by the GE papaya in Hawaii is its impact on organic agriculture. In most parts of the world, foods that are certified as organic cannot be genetically engineered. Thus, organic papaya farmers obviously avoid GE seeds and, if an organic farmer's crop is contaminated by GE papaya pollen, the fruit cannot be sold as organic. This latter type of contamination can be devastating for organic farmers, because pollution from GE pollen may not be noticed until after the farmer has worked hard to produce the fruit using environmentally-friendly organic methods.

A study of the problem in Hawaii produced alarming results. When GE papayas and conventional papaya were planted near one another, contamination was emphatically confirmed. 70% of conventional female papaya plants planted up to 26 meters from the GE crop were contaminated with GE papaya pollen.<sup>7</sup> Some papaya plants are naturally both male and female (hermaphrodites), and these were contaminated at a lower rate (13%), however, the overall contamination level was a startling 38%.

The University of Hawaii's 'solution' to the problem is not to control the polluting GE papaya pollen; but to thrust the burden on organic farmers. In a publication for farmers, it tells organic producers that they should move their fields a quarter mile (approximately 0.4 km) or more from GE papaya, that they should kill female papaya plants, that they should place bags around the flower buds of hermaphrodite plants to prevent farm-saved seed from being contaminated, and to never plant open pollinated seeds.

As for GE papaya farmers, it makes no recommendations other than business as usual. Because of the severity of the contamination problem, much of Hawaii's organic papaya is no longer grown on the Big Island. Instead, smaller operations on other islands such as Kauai and Molokai are producing the Islands' organic fruit. These operations are constantly threatened by GE pollen which can be spread through contaminated seeds or by a backyard gardener or farmer accidentally (or deliberately) planting GE fruit.

Organic papaya farmers are some of the only small scale family farmers left in Hawaii. They protect and develop the soil and biodiversity on the islands and they also represent the best opportunity for Hawaiian Papaya to compete on international markets. However the contamination from the GE papaya threatens to kill off this otherwise successful enterprise unless urgent action is taken to protect them from GE contamination.

7 | Manshardt, R. 2002. Is Organic Papaya Production in Hawaii Threatened by Cross-Pollination with Genetically Engineered Varieties? UH Cooperative Extension Service, B10-1 (information sheet), October 2002.





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### III A REPUTATION AT RISK: THE UNIVERSITY OF HAWAII'S COLLEGE OF TROPICAL AGRICULTURE

There's a lot riding on the GE papaya for the University of Hawaii's College of Tropical Agriculture (UH). UH co-developed the fruit with scientists from other institutions. Although fewer and fewer acres are sown in papayas, UH is promoting an illusion of success. To help the public relations effort, UH is working with the International Food Information Council (IFIC), an industry association based in Washington.<sup>8</sup>

One junior UH professor, Ania Wieczorek, routinely contacts the press claiming that she is an unbiased 'agricultural biotechnology educator'. Until recently, she was at Cornell University, where the GE papaya was first created. She works for the UH college that released the GE papaya and which produces Hawaii's GE papaya seeds. She shares a US government genetic engineering 'education' grant with the inventor of the GE papaya, Dennis Gonsalves, who heads the US Department of Agriculture's Pacific Basin Research Centre in Hilo, Hawaii.<sup>9</sup> Nevertheless, the professor insists that she has no stake in the debate. Claiming to be looking out for the interests of the people of Hawaii, she makes arguments in favor of the GE fruit; but says that she is neutral.<sup>10</sup>

It is a very strange kind of 'neutrality'. When Hawaiian activists announced a plan to dump GE papayas at UH's agriculture campus as an expression of their disgust, IFIC obtained an early copy of their press release and alerted UH.<sup>11</sup> The 'educator' professor immediately sent e-mails to Hawaiian newspapers trying to cast doubt on the activists. Eager to please her superiors, she then e-mailed senior UH officials to assure them that she would quickly fly to the Big Island to defend UH at the activists' event.<sup>12</sup>

Why the unsavory tactics? If the GE papaya continues to lead Hawaiian farmers into oblivion, UH research will have co-authored the death of a significant Hawaiian agricultural sector. Such a huge error would be very bad for the reputation of UH's agriculture school. In the case of the GE papaya, UH 'educational' efforts and claims of independence cannot be trusted, because UH's reputation is at stake.

The UH and other genetic engineering promoters, who praised the ringspot virus-resistant GE papaya as a genetic engineering success story, are desperate to hide the reality. If it becomes obvious that in reality it is a failure, and actually that genetic engineering caused more harm to the Hawaiian papaya market than the virus, the industry would face a huge public relation disaster that could harm GE crops in general.

One of the reasons why it's so important that GE papaya is perceived as a success in Hawaii is the aim to develop GE virus resistant papaya in SE Asia (e.g. Philippines, Thailand), where the GE industry is using this orphan crop to gain acceptance of GE crops.<sup>13</sup> However, field trials of GE papaya in Thailand were already found to cause contamination and were destroyed.<sup>14</sup>

8 | Toner, C. 2004. Electronic mail from Cheryl Toner of IFIC to Frank Perkins, UH Assistant Vice President for Research, 8 September 2004. Obtained in a request under the Hawaii Uniform Information Practices Act (UIIPA).

9 | Gonsalves, D., Wieczorek, A. (co-investigators). Communication in Agricultural Biotechnology, USDA Research Project, Project number 5320-21000-010-06, from Sep 30, 2003 to Jul 31, 2008, summarized at [http://www.ars.usda.gov/research/projects/projects.htm?ACCN\\_NO=407745](http://www.ars.usda.gov/research/projects/projects.htm?ACCN_NO=407745)

10 | See e.g. Wieczorek, A. Genetically engineered crops, science and regulation behind consumer safety. College of Tropical Agriculture and Human Resources. [http://www.ctahr.hawaii.edu/gmo/video/videoreal\\_ania\\_health.asp](http://www.ctahr.hawaii.edu/gmo/video/videoreal_ania_health.asp) Toner 2004, op cit.

11 | Perkins, F., Wieczorek, A., Olipares, H. 2004. Electronic mails exchanged by Frank Perkins, Jim Manke, Ania Wieczorek, and Hubert Olipares (all of UH), 8 September 2004, obtained in a request under the Hawaii UIIPA.

13 | See, e.g.

14 | [http://www.isaaa.org/Regional\\_centers/SEAsiacenter/ABSP11/papaya/prsv.htm](http://www.isaaa.org/Regional_centers/SEAsiacenter/ABSP11/papaya/prsv.htm) Rogers, L. 2005. GM contamination in Thai papaya orchards. Outlook on Agriculture 34: 273-274.

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### IV THE ILLUSION OF SUCCESS, BUT THE REALITY A DISASTER

The GE papaya has not been a success in Hawaii - an assessment based on USDA data actually proves that the introduction and cultivation of GE papaya in Hawaii has been a disaster. All major statistical indicators of the health of the Hawaiian papaya industry have declined since the GE fruit's introduction. The industry is getting smaller. Prices are down. Production of fresh papayas is at its lowest level in more than a generation. The Hawaiian papaya industry has already lost export markets and, if present trends continue, it will shrink to the point of being only for the local market. If that comes to pass, GE papaya promoters will have only themselves to blame for the decline of their industry.

It seems clear that GE papaya is more devastating than the virus - the papaya industry was in better shape during the 'virus attack' than it has been ever since the introduction of GE papaya. While the virus can harm papayas, and can make conventional papaya growing difficult, it does not pose a serious problem for organic papaya farmers.

Due to consumer preference for non-GE produce, conventional and, especially, organic papayas are worth more at market and receive a price premium over the lower-value GE fruit. Depending on the fruit and the day, this premium ranges from several US cents per kilo to triple the price of GE fruit.

Hawaii's papaya industry cannot compete with other papaya producers e.g. in South East Asia or Latin America. GE papaya is even failing in the mainland US market for fresh papayas which is steadily growing, while Hawaii's industry is getting smaller and smaller.

Backers of the GE papaya are trying to dig out of their hole by mounting public relations campaigns in the US and internationally. In the US, the University of Hawaii is working with industry to disseminate allegedly 'unbiased' and 'neutral' information. This campaign is rife with major conflicts of interest and its 'educational' work is actually used to attack Hawaiian NGOs, farmers, and others that are critical of the GE papaya experiment. Internationally, US universities and government agencies are promoting the GE papaya with claims that it has been successful in Hawaii, pushing other countries to sow GE papayas based on false and misleading information about the impacts of GE papayas in Hawaii.

The lack of open debate is, at least partially, caused by the need for GE papaya to be seen as a success in Hawaii by the global genetic engineering industry in order to facilitate expansion of GE crops into SE Asia.

Perhaps most sadly, the GE papaya is harming organic farmers, who have had the burden of defending against rogue GE papaya pollen unfairly thrust upon them.

The survival of Hawaii GE papaya industry depends on other countries adopting and allowing GE papaya. The genetic engineering industry and its promoters who foster a myth of the GE papaya success in Hawaii desperately need other countries to adopt this GE papaya as a way to maintain that myth about the merits for Hawaii and to be able to prevent a public relation backlash that would affect GE crops and food in general.

27 JULY 2004, KHON KAEN, THAILAND  
THAI ACTIVISTS SEAL OFF THE GE PAPAYA AT THE  
KHON KAEN AGRICULTURAL RESEARCH STATION OF  
THE DEPARTMENT OF AGRICULTURE.

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The US Pacific Basin Agricultural Research Center, lead by Dennis Gonsalves, mentions as one of its objectives until 2011, to *“develop, transfer, and commercialize transgenic papaya for developing countries.”*<sup>15</sup> The industry organisation ISAAA set up the Papaya Biotechnology Network in South East Asia, claiming that its mission is *“to improve the quality of life of resource-poor farming families in Southeast Asia by enhancing income generation, food production, nutrition, and productivity.”* The contrary of all this was achieved through the introduction of GE papaya in Hawaii.

The consequences of growing GE papaya in a country like Thailand are feared to be even more serious than in Hawaii. Not only is green papaya eaten as a daily staple food, it is also grown everywhere - in farmers' fields, schoolyards and backyard gardens, increasing the risk of contamination even more. The disastrous experiences with GE papaya in Hawaii should be a serious warning sign for other countries.



15 | Tropical Plant Physiology, Disease and Production Unit of the U.S. Pacific Basin Agricultural Research Center. 2006. Background. [http://www.ars.usda.gov/main/site\\_main.htm?modecode=53-20-03-35](http://www.ars.usda.gov/main/site_main.htm?modecode=53-20-03-35)

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