

**EXCERPT FROM MARION NESTLE'S *WHAT TO EAT* (NORTH POINT PRESS, 2006)**

**CHAPTER 5. THE PRODUCE SECTION: GENETICALLY MODIFIED, IRRADIATED, AND POLITICIZED**

The produce sections of supermarkets raise no end of questions. One that particularly interests me, for example, is whether supermarkets are selling genetically modified (GM) fresh fruits and vegetables, those whose genes have been deliberately manipulated to give the plants some desirable trait—resistance to insects or viruses, for example. Tinkering with plant genes sometimes generates issues about safety and other matters, but when I asked produce managers if their stores carried GM foods, they looked puzzled and said they really didn't know. GM foods are supposed to be labeled voluntarily with PLU (Product Look-Up) codes that begin with 8, but I never have been able to find one. Once, I was intrigued to see a PLU code beginning with an 8 on a honeydew melon at a Costco in New Jersey, but I knew that the FDA had not permitted any GM honeydews to be marketed, and its grower told me that the melons were not, in fact, genetically engineered; instead, Costco uses its own coding system.

I did score the opposite, though. In the Hong Kong supermarket in Manhattan's Chinatown I found a papaya with a label saying "no GMO, no irradiation, no hot water treatment, 100% natural tree-ripened" (no GMO stands for "no Genetically Modified Organisms"). The papaya may have been 100% tree-ripened, but it was anything but ripe and I had no simple way to evaluate the accuracy of the other statements.

Under our current system of food regulation, GM foods do not have to be labeled as such. Why not? In 1994, when the first GM foods were ready to be marketed, biotechnology companies argued that because genetic engineering methods were fundamentally identical to those used in conventional plant breeding, labeling would mislead you into thinking GM foods were different and somehow inferior. For reasons that were in part scientific and in part in response to industry pressures, the FDA agreed with the companies' interpretation of the science, and ruled that labeling was unnecessary. In *Safe Food*, I discuss whether GM techniques really do differ in any meaningful way from traditional methods, especially when they introduce genes from one species into another. My conclusion? This is a matter of judgment. Whether you view GM manipulations as the same as traditional techniques or different depends on point of view, and, therefore, on politics. Scientifically based or not, the motivation of biotechnology companies for opposing labeling is obvious: if the foods are labeled as GM, you might choose not to buy them.

In theory, you should be able to find GM fruits or vegetables in supermarket produce sections because the FDA allows several kinds to be grown and marketed. The list is short because only a few have gone through the FDA's review processes. The FDA does not exactly "approve" GM foods for human consumption. Instead, it requires the companies planning to grow such foods to enter into a "consultation process." The FDA explains the process in its inimitable fashion:

The FDA does not conduct a comprehensive scientific review of data generated by the developer. Instead, the FDA considers, based on agency scientists' evaluation of the available information, whether any unresolved issues exist regarding the food

derived from the new plant variety that would necessitate legal action by the agency if the product were introduced into commerce. Examples of unresolved issues may include, but are not limited to, significantly increased levels of plant toxicants or anti-nutrients, reduction of important nutrients, new allergens, or the presence in the food of an unapproved food additive. The FDA considers a consultation to be completed when all safety and regulatory issues are resolved.

Whatever. As of 2004, the FDA had completed consultations for some GM field crops: corn, rice, soybeans, sugar beets, canola, oilseed rape, and wheat. These commodities are mainly used for animal feed, although they also are used as ingredients in processed foods on supermarket shelves. The FDA also "resolved the regulatory issues" for several kinds of fruits and vegetables: tomatoes and cantaloupe with genes that delay ripening or inhibit softening, tomatoes and potatoes with genes for insect resistance, radicchio resistant to herbicides, and squash and papaya resistant to viruses. Because the FDA has cleared these GM fruits and vegetables for production, they could--in theory--be on sale in supermarket produce sections.

But are they? I asked supermarket customer relations representatives, advocacy groups critical of biotechnology (Greenpeace, Environmental Defense, Union of Concerned Scientists, Friends of the Earth), trade associations for the produce industry (United Fresh Fruit and Vegetable Association, Produce for Better Health Foundation), and experts working in various branches of the USDA and in universities. Nobody could say for sure. University and government scientists said that GM tomatoes, potatoes, and squash were around at some point, but that developers stopped producing them either because of problems with production or transportation, or because retailers did not want to risk objections from customers opposed to such foods.

The one GM fruit that seems to have held its own is the papaya. About 80% of the papayas grown in Hawaii are genetically modified to resist the ringspot virus, which nearly destroyed the Hawaiian industry for this fruit a few years ago. The GM varieties are widely regarded as saving that industry. But if GM papayas are being sold in mainland supermarkets, this has to be an exceedingly well kept secret.

In Hawaii, however, the secret is out. In September 2004, two groups--the Hawaii Genetic Engineering Action Network, and one called GMO-Free Hawaii--announced that tests proved that pollen from GM papayas must have "drifted" and gotten into conventional papayas. This meant that the modified genes for resistance to ringspot were now appearing in supposedly non-GM papayas. I did not think this had safety implications (the fruit seems just fine to eat), but it did say something about the inability of biotechnology companies to keep their genes under control.

If GM papayas are grown in Hawaii, I wondered whether they were being sold in mainland supermarkets. I contacted GeneticID, a company in Fairfield, Iowa that tests for such things, and an official sent me some instructions for collecting papaya seeds and preparing them for genetic evaluation. This required help from my adult children in California, because Hawaiian papayas rarely get to the East Coast (the ones sold in the East most often come from Central and South America). The instructions said we were to scoop out the seeds, separate them as best we could from the stringy flesh, wash them, freeze them, and ship them off to Iowa via overnight mail. For the samples I managed to collect in

Manhattan, this was a sticky job, and I am still finding tiny pieces of orange papaya stuck in odd places in my kitchen.

Together, we came up with three Hawaiian papayas from different producers. Scientist that I am, I also tossed in a couple of controls: a Hawaiian papaya labeled Certified Organic, and the non-GMO papaya from the Hong Kong market in Chinatown, which turned out to come from Jamaica. These two would be expected to test negative. Furthermore, to make sure the tests were fair, I labeled the frozen seeds with the places where we bought the papayas, but did not tell GeneticID the grower's brand name, the place where the papayas had been grown, or the PLU codes on their stickers. Here are the results:

### Are papayas genetically modified?

| PAPAYA BRAND AND PLU CODE                           | PLACE PURCHASED                           | GENETICALLY MODIFIED TO CONTAIN GENE FOR RESISTANCE TO RINGSPOT VIRUS? |
|---|---|--|
| Pride of Hawaii<br>(labeled as irradiated)<br>#4394 | Cala Foods, San Francisco                 | Yes  |
| Hawaiian Premium Cole<br>#4394                      | Vons, South Pasadena                      | Yes  |
| Hawaiian Calavo Gold<br>#4394                       | Gourmet Garage, Manhattan                 | Yes  |
| Hawaii Organics<br>(Certified Organic)<br>#9-3111   | Wholesome Market,<br>Manhattan            | No   |
| Martha's Best (from<br>Jamaica)<br>#3111            | Hong Kong Market,<br>Chinatown, Manhattan | No   |

The results of even this small sample provide enough evidence for some clear conclusions. If you buy a papaya from Hawaii, there is a good chance it is genetically modified. If the label says "non-GMO," you can believe that claim, as well. And, if the label says a food is organic, it is. This last conclusion is yet another reason for confidence in the Certified Organic seal. And organic foods always should be GM-free.

### FOOD IRRADIATION

The Hawaii Pride papaya was labeled as irradiated, and the irradiation story is also interesting, but for different reasons. Hawaiian tropical fruits that could be infested by exotic species of fruit fly are under quarantine and cannot be exported to the mainland unless treated first to get rid of the flies and their eggs. This used to be done with toxic

gases, but such gases are now considered environmental hazards. Heat treatment also worked, but it ruined the appearance of the fruit. "Electronic" irradiation solves those problems. This form of irradiation is not what you might think. It uses electricity--not radioactive isotopes--to kill the flies and eggs on the skin of the fruit. This should not matter because you do not eat the papaya peel anyway.

Hawaii Pride discloses its use of irradiation on papayas shipped to the West Coast on labels and on its website. My daughter, who lives in San Francisco, mailed me a PLU-code sticker from one of that company's papayas and I was surprised to see that the sticker was printed with an irradiation symbol. I rarely see that symbol on foods, even though fruits and vegetables were approved for irradiation in 1986, as were herbs and spices, and Hawaii Pride has been shipping irradiated papayas to the mainland since 2000.

By law, irradiated foods are supposed to be labeled with a symbol (the "radura," which looks rather like a flower) and a statement like "treated with irradiation." But Congress specified that the print did not have to be very large, and the papaya growers happily took the hint. PLU code stickers are small to begin with, and the radura and disclosure statement on that papaya--"Irradiated for safety with SureBeam"--were so tiny that I practically needed a magnifying glass to read them.

Unless their labels state otherwise, I assume that commercial dried herbs and spices have been irradiated electronically or using radioisotopes, even though I have never found a box of them bearing a radura label. I do not think that electronic or any other kind of irradiation of fruit and dried spices poses health problems. Irradiation of meat, however, raises different issues that I will get to in a later chapter.

I was surprised to see SureBeam mentioned on the sticker as a source of the irradiation because I had read that the company went bankrupt in January 2004. A spokesperson for Hawaii Pride explained that another company (Titan Corporation's Pulse Science Division) had taken over SureBeam's facilities without a break in irradiation service. I found no other brands of Hawaiian papayas with raduras, yet all must have been treated in some way to get rid of fruit flies. How they were treated is another secret, apparently.

I think you have a right to know whether the foods you buy are genetically modified or irradiated, and that companies should fully disclose these processes--for reasons of consumer choice if nothing else. The issues may not matter much in practice because so few treated foods are in supermarkets--Hawaiian papayas are a rare exception. At the moment, practically no other GM or irradiated foods are in the produce sections of American supermarkets (or supermarkets anywhere else), and many retailers would prefer not to carry them. The stores have plenty of choices to offer you without getting into issues--some scientifically resolvable, some not--that might make you want to shop elsewhere.

## **THE POLITICS OF FRUITS AND VEGETABLES**

Any government dietary guideline that suggests eating less of anything is bound to be controversial, not least because the companies that produce foods singled out for "eat less" messages are sure to complain. Messages to "eat more," however, please everyone in the food business. The pleasure of having a positive message explains why one guideline consistently remains unchallenged--to eat more fruits and vegetables. If you eat a variety of fruits and vegetables, you will have less of a chance of getting heart disease, certain

cancers, and many other health problems. People who eat five or more servings of fruits and vegetables daily, for example, have half the cancer risk of people who eat only two servings. Vegetarians have lower rates of heart disease and cancer, as did Asian and Mediterranean populations who traditionally ate diets based largely on fruits, vegetables, and grains. Fruits and vegetables contain protective vitamins and minerals, phytochemicals, and fiber, and, they are low in calories—all good reasons for eating them.

But most people do not. The USDA's Pyramid food guide released in 2005 recommends four daily servings of fruit, and five servings of vegetables, which seems like a lot. But these are *standard* servings and in comparison to what you might consider a serving, they are minuscule--the equivalent of half a cup (exception: the portion size for salad greens is one cup). Eat a good size orange or banana, and you have consumed two Pyramid fruit servings, or come close to that amount. But for reasons of taste preference, inconvenience, or expense, you probably eat only half the recommended amount of fruit. Whether you meet the recommendations for vegetables depends on your definition. Unbelievable as it may seem, one-third of all vegetables consumed in the United States come from just three sources: French fries, potato chips, and iceberg lettuce.

So why don't Americans eat more fruits and vegetables? Perhaps you don't care for them. Perhaps you do not like peeling oranges or dealing with apple cores (but there are pre-cut varieties, and fruit juices as well). Perhaps it is a matter of waste; you will have to throw away inedible pits, stems, and leaves. Or perhaps, like many people, you think they are too expensive (but you are probably willing to pay \$3.50 for a pound of potato chips, which is what the cost of a small package works out to be, or \$15 for a pound of chocolates). Or perhaps produce seems expensive in comparison to meat. If this is the case, it is not because produce is artificially expensive; it is because meat is artificially cheap. The government subsidizes its cost by supporting farmers who produce feed for animals.

Because surveys and other studies say that expense is a major barrier that keeps many people from eating fruits and vegetables, some USDA economists thought it might be useful to find out what such foods really cost. These particular economists work for the Economic Research Service, a low-profile unit of USDA that quietly goes about its business of looking at practical questions like this one. In the late 1990s, they recorded the cost of more than 50 commonly consumed fruits and vegetables, accounted for waste, and figured out the actual cost per serving. Their stunning conclusion: you can eat the full daily complement of servings recommended at that time—three fruits and four vegetables--for just 64 cents (in 1999 dollars). This cost is so little that even people on very low incomes could afford it.

How, you ask, could this be remotely possible? The answer: *portion size*. They counted servings by USDA standards, and you can get a lot of half-cup servings out of a pound of fruit or vegetables.

I have to confess that I found this study so hard to believe that I went right out and repeated the experiment myself. I got a supermarket checker to weigh me out exactly one pound of green beans, for which I paid 99 cents (in mid-summer 2004). I took the beans home, washed them, trimmed off the ends, tossed out all the parts that seemed inedible, and cut what was left into bite-size pieces. I took a half-cup measure and started counting. That pound of cut green beans filled the half cup measure nine times--nine half-

cup servings—and these were generous half cups. At this rate, a standard serving of green beans cost only 11 cents. Even if a full cup of green beans is a more reasonable serving size for any normal person, that pound of beans could serve four at a cost of 25 cents per person—and each person would be eating two standard USDA vegetable servings. This USDA study produced one other intriguing result. After accounting for the parts that get thrown out, the economists reported that most of the fruits and vegetables they examined cost less fresh than they did either canned or frozen. You don't believe this? You can easily repeat the experiment at the supermarket and see for yourself.

If this study has merit, and I think it does, cost cannot really be the barrier that keeps people from eating fresh fruits and vegetables. Indeed, the studies show that it is not the absolute cost of produce that seems so high, but its cost per calorie. You get a lot more calories for the price of hamburgers and French fries than you do for carrots, not least because the government subsidizes the production of corn and soybeans, the basis of cheap corn sweeteners and vegetable oil. But I also think marketing is an important barrier. American food and beverage producers spend \$36 billion annually to advertise and market their products, but practically none of this goes to promote fruits and vegetables—a few million dollars a year compared to the tens or hundreds of millions used to promote any single soft drink, candy bar, or breakfast cereal. These foods are just not profitable enough. The companies that grow fruits and vegetables get about 18 cents of every food dollar you spend on these foods. The other 82 cents goes to everyone else in this game: the companies that store, truck, package, display, market, and sell produce. What's more, there is no easy way for the companies to add value to fruits and vegetables and so increase their profit margins. Tomatoes are tomatoes, no matter what their brand. Baby carrots, bagged salads, and organic production methods are among the very few ways to add value. And because produce is perishable, it is more expensive to handle and keep fresh than processed foods.

All of this means that fruit and vegetable growers do not have the kind of money to put into advertising that is available to the makers of sodas, breakfast cereals, and potato chips. Many of the produce companies are small and independent. Perhaps most important, the industry is not unified. Growers view each other as competitors--peaches vs. pears, carrots vs. cauliflower—rather than as part of an industry with common goals. In contrast, the meat and dairy industries sell one product and can more easily band together to market milk or beef collectively. Without much marketing, the strongest encouragement for you to buy fruits and vegetables is their appearance--how beautiful they look in the produce sections of supermarkets.

Yes, supermarkets make money on fruits and vegetables—they are in business to do so--but some of them make remarkable efforts to acquire a large variety of excellent produce and to maintain its quality. If you are fortunate enough to live near a market with a good produce section, go meet its manager and offer heartfelt thanks.

### **ON CHOICES IN THE PRODUCE SECTION**

After all of my wanderings through supermarket produce sections, it came as a great relief to shop at the Wholesome Market, an all-organic grocery that used to be located not far from where I work (it closed in spring 2005, shortly after a Whole Foods moved into the neighborhood a couple of blocks away). Its produce section had bananas

from Ecuador, cantaloupe from California, coconuts from Hawaii, mangos from Mexico, squash from Colorado, and fresh herbs, salad greens, and all of the usual vegetables, every single one of them Certified Organic, and every one of them with a PLU-code sticker beginning with a 9. This made the choice so much easier: organic vs. organic. Locally grown? Well, that may be asking too much. It took a long time to get organics into supermarkets. Locally grown is the wave of the future and its time will surely come.

From a health perspective, fruits and vegetables are good to eat, whether they are organic or not. If the price of organics is a barrier, go ahead and buy conventional produce instead. Conventionally grown fruits and vegetables confer plenty of health benefits to people, if not to the planet. Does price matter? Of course it does. I view the price of organics as a political choice. When you choose organics, you are voting with your fork for a planet with fewer pesticides, richer soil, and cleaner water supplies—all better in the long run. When you choose locally grown produce, you are voting for conservation of fuel resources and the economic viability of local communities, along with freshness and better taste. Once you consider such things, the choices in the produce section are much easier to make. Whenever I have the choice, here are my priorities in that section: (1) Organic and locally grown, (2) Organic, (3) Conventional and locally grown, (4) Conventional.

## NOTES

**The FDA explains....** FDA policies, procedures, and consultations on food biotechnology are at [www.cfsan.fda.gov](http://www.cfsan.fda.gov).

**In September 2004....** This was reported by Stephen Clapp, "Anti-biotech groups charge contamination of Hawaiian papaya," *Food Chemical News*, p. 6, September 20, 2004.

**At least one company....** The company explains the technique and its reasons for using it, and answers FAQs on its website, [www.hawaiipride.com](http://www.hawaiipride.com).

**The USDA's Pyramid food guide....** This can be found at [www.mypyramid.gov](http://www.mypyramid.gov).

**Unbelievable as it may seem...** Mary K. Serdula and others. Trends in fruit and vegetable consumption among adults in the United States: Behavioral Risk Factor Surveillance System, 1994-2000. *American Journal of Public Health*, Vol. 94, No. 6, pp. 1014-1018, June 2004.

**I know lots of people....** Potato chips are an expensive way to eat potatoes. Potatoes were less than one dollar a pound in July 2004, but the cheapest chips I could find at my local convenience store were \$1.19 for 5.5 ounces, which comes to \$3.46 per pound.

**But because expense seems....** See, for example, Adam Drewnowski and Nicole Darmon, "Food choices and diet costs: an economic analysis," *Journal of Nutrition*, Vol. 135, pp. 900-904, 2005, and Karen M. Jetter and Diana L. Cassady, "The availability and cost of healthier food items," AIC Issues Brief No. 29, University of California Agricultural Issues Center, March 2005. The countering study is Jane Reed, Elizabeth Frazão, and Rachel Itskowitz, *How Much Do Americans Pay for Fruits and Vegetables?* USDA Economic Research Service, Bulletin No. 790, July 2004, at: [www.ers.usda.gov/publications/aib790](http://www.ers.usda.gov/publications/aib790).