The Great Con-ola

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Canola oil is “widely recognized as the healthiest salad and cooking oil available to consumers.” It was developed through hybridization of rape seed. Rape seed oil is toxic because it contains significant amounts of a poisonous substance called erucic acid. Canola oil contains only trace amounts of erucic acid and its unique fatty acid profile, rich in oleic acid and low in saturated fats, makes it particularly beneficial for the prevention of heart disease. It also contains significant amounts of omega-3 fatty acids, also shown to have health benefits. This is what the food industry says about canola oil.

Canola oil is a poisonous substance, an industrial oil that does not belong in the body. It contains “the infamous chemical warfare agent mustard gas,” hemagglutinins and toxic cyanide-containing glycocides; it causes mad cow disease, blindness, nervous disorders, clumping of blood cells and depression of the immune system. This is what detractors say about canola oil.

How is the consumer to sort out the conflicting claims about canola oil? Is canola oil a dream come true or a deadly poison? And why has canola captured so large a share of the oils used in processed foods?

HIDDEN HISTORY

Let’s start with some history. The time period is the mid-1980s and the food industry has a problem. In collusion with the American Heart Association, numerous government agencies and departments of nutrition at major universities, the industry had been promoting polyunsaturated oils as a heart-healthy alternative to “artery-clogging” saturated fats. Unfortunately, it had become increasingly clear that polyunsaturated oils, particularly corn oil and soybean oil, cause numerous health problems, including and especially cancer.[1]

The industry was in a bind. It could not continue using large amounts of liquid polyunsaturated oils and make health claims about them in the face of mounting evidence of their dangers. Nor could manufacturers return to using traditional healthy saturates–butter, lard, tallow, palm oil and coconut oil–without causing an uproar. Besides, these fats cost too much for the cut-throat profit margins in the industry.

The solution was to embrace the use of monounsaturated oils, such as olive oil. Studies had shown that olive oil has a “better” effect than polyunsaturated oils on cholesterol levels and other blood parameters. Besides, Ancel Keys and other promoters of the diet-heart idea had popularized the notion that the Mediterranean diet–rich in olive oil and conjuring up images of a carefree existence on sun-drenched islands–protected against heart disease and ensured a long and healthy life.

The National Heart, Lung and Blood Institute (NHLBI) sponsored the First Colloquium on Monounsaturates in Philadelphia. The meeting was chaired by Scott Grundy, a prolific writer and apologist for the notion that cholesterol and animal fats cause heart disease. Representatives from the edible oil industry, including Unilever, were in attendance. The Second Colloquium on

Monounsaturates took place in Bethesda, Maryland, early in 1987. Dr. Grundy was joined by Claude Lenfant, head of the NHLBI, and speakers included Fred Mattson, who had spent many years at Proctor and Gamble, and the Dutch scientist Martign Katan, who would later publish research on the problems with trans fatty acids. It was at this time that articles extolling the virtues of olive oil began to appear in the popular press.

Promotion of olive oil, which had a long history of use, seemed more scientifically sound to the health-conscious consumer than the promotion of corn and soy oil, which could only be extracted with modern stainless steel presses. The problem for the industry was that there was not enough olive oil in the world to meet its needs. And, like butter and other traditional fats, olive oil was too expensive to use in most processed foods. The industry needed a less expensive monounsaturated oil.

Rapeseed oil was a monounsaturated oil that had been used extensively in many parts of the world, notably in China, Japan and India. It contains almost 60 percent monounsaturated fatty acids (compared to about 70 percent in olive oil). Unfortunately, about two-thirds of the mono-unsaturated fatty acids in rapeseed oil are erucic acid, a 22-carbon monounsaturated fatty acid that had been associated with Keshan's disease, characterized by fibrotic lesions of the heart. In the late 1970s, using a technique of genetic manipulation involving seed splitting,[2] Canadian plant breeders came up with a variety of rapeseed that produced a monounsaturated oil low in 22-carbon erucic acid and high in 18-carbon oleic acid.

The new oil referred to as LEAR oil, for Low Erucic Acid Rapeseed, was slow to catch on in the US. In 1986, Cargill announced the sale of LEAR oil seed to US farmers and provided LEAR oil processing at its Riverside, North Dakota plant but prices dropped and farmers took a hit.[3]

MARKETING LEAR

Before LEAR oil could be promoted as a healthy alternative to polyunsaturated oils, it needed a new name. Neither "rape" nor "lear" could be expected to invoke a healthy image for the new "Cinderella" crop. In 1978, the industry settled on "canola," for "Canadian oil," since most of the new rapeseed at that time was grown in Canada. "Canola" also sounded like "can do" and "payola," both positive phrases in marketing lingo. However, the new name did not come into widespread use until the early 1990s.

An initial challenge for the Canola Council of Canada was the fact that rapeseed was never given GRAS (Generally Recognized as Safe) status by the US Food and Drug Administration. A change in regulation would be necessary before canola could be marketed in the US.4 Just how this was done has not been revealed, but GRAS status was granted in 1985, for which, it is rumored, the Canadian government spent $50 million to obtain.

Since canola was aimed at the growing numbers of health-conscious consumers, rather than the junk food market, it required more subtle marketing techniques than television advertising. The industry had managed to manipulate the science to make a perfect match with canola oil–very low in saturated fat and rich in monounsaturates. In addition, canola oil contains about 10 percent omega-3 fatty acids, the most recent discovery of establishment nutritionists. Most Americans are deficient in omega-3 fatty acids, which had been shown to be beneficial to the heart and immune system. The challenge was to market this dream-come-true fatty acid profile in a way that would appeal to educated consumers.

Canola oil began to appear in the recipes of cutting edge health books, such as those by Andrew Weil and Barry Sears. The technique was to extol the virtues of the Mediterranean diet and olive oil in the text, and then call for “olive oil or canola oil” in the recipes. One informant in the publishing industry told us that since the mid 1990s, major publishers would not accept cookbooks unless they included canola in the recipes.

In 1997, Harper Collins engaged Dr. Artemis Simopoulos to write a cookbook featuring the health benefits of omega-3 fatty acids.[5] Dr. Simopoulos was a pediatrician who had served for nine years as chair of the Nutritional Coordinating Committee of the National Institutes of Health before becoming president of the Center for Genetics, Nutrition and Health. She had published several papers on omega-3 fatty acids, calling attention to their disappearance from the food supply due to the industrialization of agriculture. Her most famous paper, published in 1992 in the *American Journal of Clinical Nutrition*, compared omega-3 levels in supermarket eggs from hens raised on corn with eggs from hens allowed to roam and eat a more varied diet.[6] The more natural eggs contained twenty times more omega-3 than supermarket eggs.


Empty cans of canola oil in an alley behind a Chinese restaurant. In China, lard was traditionally used for frying.

Simopoulos’s *The Omega Plan* came out in 1998 and was reissued as *The Omega Diet* in 1999. The book discusses the virtues of monounsaturated and omega-3 fatty acids in the Mediterranean diet.[7] Since unprocessed canola oil contains not only lots of monounsaturated fatty acids, but also a significant amount of omega-3, it shows up in most of the book’s recipes. Simopoulos claims that the Mediterranean diet is low in saturated fat and recommends lean meat and lowfat yoghurt and milk as part of her regime.

The canola industry’s approach– scientific conferences, promotion to upscale consumers through books like *The Omega Diet* and articles in the health section of newspapers and magazines–was successful. By the late 1990s, canola use had soared, and not just in the US. Today China, Japan, Europe, Mexico, Bangladesh and Pakistan all buy significant amounts. Canola does well in arid environments such as Australia and the Canadian plains, where it has become a major cash crop. It is the oil of choice in gourmet and health food markets like Fresh Fields (Whole Foods) markets, and shows up in many supermarket items as well. It is a commonly used oil in sterol-containing margarines and spreads recommended for cholesterol lowering. Use of hydrogenated canola oil for frying is increasing, especially in restaurants.

DANGERS OVERSTATED

Reports on the dangers of rapeseed oil are rampant on the internet, mostly stemming from an article, “Blindness, Mad Cow Disease and Canola Oil,” by John Thomas, which appeared in *Perceptions* magazine, March/April 1996. Some of the claims are ludicrous. Although rape is a member of the brassica or mustard family, it is not the source of mustard gas used in chemical warfare.

Glycosides or glycosinolates (compounds that produce sugars on hydrolysis) are found in most members of the brassica family, including broccoli, kale, cabbage and mustard greens. They contain sulfur (not arsenic), which is what gives mustard and cruciferous vegetables their pungent flavor. These compounds are goitrogenic and must be neutralized by cooking or fermentation. As rapeseed meal was high in glycosides, it could not be used in large amounts for animal feeding. However, plant breeders have been able to breed out the glycosides as well as the erucic acid from canola oil.[8] The result is a low-glycoside meal that can be used as an animal feed. In fact, canola meal for animal feed is an important Canadian export.

Hemagglutinins, substances that promote blood clotting and depress growth, are found in the protein portion of the seed, although traces may show up in the oil. And canola oil was not the cause of the mad cow epidemic in Britain[9], although feeding of canola oil may make cattle more susceptible to certain diseases.

Like all fats and oils, rapeseed oil has industrial uses. It can be used as an insecticide, a lubricant, a fuel and in soap, synthetic rubber and ink. Like flax oil and walnut oil, it can be used to make varnish. Traditional fats like coconut oil, olive oil and tallow also have industrial uses, but that does not make them dangerous for human consumption.

We have had reports of allergies to canola, and internet articles describe a variety of symptoms–tremors, shaking, palsy, lack of coordination, slurred speech, memory problems, blurred vision, problems with urination, numbness and tingling in the extremities, and heart arrhythmias–that cleared up on discontinuance of canola. None of this has been reported in the medical journals, however. Writing for the *Washington Post*, Professor Robert L. Wolke (www. professorscience.net) chastises the publishers of these reports as spreading “hysterical urban legends about bizarre diseases.”[10] The industry actually profits from such wild claims, because they are wrong and easily dismissed.

Nevertheless, consumers *do* have reason to be cautious about the establishment’s favorite oil, now showing up in an increasing number of products.

THE STUDIES

Says Wolke: “I found no research studies indicating that today’s low-erucic-acid canola oil, as distinguished from ordinary rapeseed oil, is harmful to humans.” That’s because, even though canola oil now has Generally Recognized as Safe (GRAS) status, no long-term studies on humans have been done.
Animal studies on Low Erucic Acid Rapeseed oil were performed when the oil was first developed and have continued to the present. The results challenge not only the health claims made for canola oil, but also the theoretical underpinnings of the diet-heart hypothesis.

The first published studies on the new oil were performed in 1978 at the Unilever research facility in the Netherlands.[11] The industry was naturally interested to know whether the new LEAR oil caused

heart lesions in test animals. In earlier studies, animals fed high-erucic-acid rape seed oil showed growth retardation and undesirable changes in various organs, especially the heart, a discovery that touched off the so-called “erucic acid crisis” and spurred plant geneticists to develop new versions of the seed. The results of the LEAR study were mixed. Rats genetically selected to be prone to heart lesions developed more lesions on the LEAR oil and the flax oil, than those on olive oil or sunflower oil, leading researchers to speculate that the omega-3 fatty acids (not erucic acid) in LEAR and flax oil might be the culprit. But rats genetically selected to be resistant to heart lesions showed no significant difference between the four oils tested and LEAR oil did not cause heart problems in mice, in contrast to high-erucic oil which induced severe cardiac necrosis.

In 1979, researchers at the Canadian Institute for Food Science and Technology pooled the results of 23 experiments involving rats at four independent laboratories. All looked at the effects of LEAR and other oils on the incidence of heart lesions. They found that saturated fats (palmitic and stearic acids) were *protective* against heart lesions but that high levels of omega-3 fatty acids correlated with high levels of lesions. They found a lesser correlation with heart lesions and erucic acid.[12]

In 1982, the same research group published a paper that looked at the interaction of saturated fats with LEAR oil and soybean oil. When saturated fats in the form of cocoa butter were added to the diets, the rats in both groups had better growth and a significant lowering of heart lesions. Said the authors: “These results support the hypothesis that myocardial lesions in male rats are related to the balance of dietary fatty acids and not to cardiotoxic contaminants in the oils.”[13]

Canadian researchers looked at LEAR oils again in 1997. They found that piglets fed milk replacement containing canola oil showed signs of vitamin E deficiency, even though the milk replacement contained adequate amounts of vitamin E.[14] Piglets fed soybean oil-based milk replacement fortified with the same amount of vitamin E did not show an increased requirement for vitamin E. Vitamin E protects cell membranes against free radical damage and is vital to a healthy cardiovascular system. In a 1998 paper, the same research group reported that piglets fed canola oil suffered from a decrease in platelet count and an increase in platelet size.[15] Bleeding time was longer in piglets fed both canola oil and rapeseed oil. These changes were mitigated by the addition of saturated fatty acids from either cocoa butter or coconut oil to the piglets’ diet. These results were confirmed in another study a year later. Canola oil was found to suppress the normal developmental increase in platelet count.[16]

Finally, studies carried out at the Health Research and Toxicology Research Divisions in Ottawa, Canada discovered that rats bred to have high blood pressure and proneness to stroke had shortened life-spans when fed canola oil as the sole source of fat.[17] The results of a later study suggested that the culprit was the sterol compounds in the oil, which “make the cell membrane more rigid” and contribute to the shortened life-span of the animals.[18]

These studies all point in the same direction–that canola oil is definitely not healthy for the cardiovascular system. Like rapeseed oil, its predecessor, canola oil is associated with fibrotic lesions of the heart. It also causes vitamin E deficiency, undesirable changes in the blood platelets and shortened life-span in stroke-prone rats when it was the only oil in the animals’ diet. Furthermore, it seems to retard growth, which is why the FDA does not allow the use of canola oil in infant formula.[19] When saturated fats are added to the diet, the undesirable effects of canola oil are mitigated. Most interesting of all is the fact that many studies show that the problems with canola oil are not related to the content of erucic acid, but more with the high levels of omega-3 fatty acids and low levels of saturated fats.

RAPESEED OIL IN TRADITIONAL DIETS

Rapeseed oil has been used in China, Japan and India for thousands of years. In areas where there is a selenium deficiency, use of rapeseed oil has been associated with a high incidence of fibrotic lesions of the heart, called Keshan's disease.[20] The animal studies carried out over the past twenty years suggest that when rapeseed oil is used in impoverished human diets, without adequately saturated fats from ghee, coconut oil or lard, then the deleterious effects are magnified. In the context of healthy traditional diets that include saturated fats, rapeseed oil, and in particular erucic acid in rapeseed oil, does not pose a problem. In fact, erucic acid is helpful in the treatment of the wasting disease adrenoleukodystrophy and was the magic ingredient in Lorenzo's oil.

High levels of omega-3 fatty acids, present in unprocessed rapeseed oil, don't pose a problem either when the diet is high in saturates. A 1998 study indicates that diets with adequate saturated fats help the body convert omega-3 fatty acids into the long-chain versions EPA and DHA, which is what the body wants to do with most of the 18-carbon omega-3s.[21] Conversion is reduced by 40-50 percent in diets lacking in saturated fats and high in omega-6 fatty acids from commercial vegetable oils (particularly soybean oil). In the animal studies on canola oil, dietary saturated fats mitigated the harmful effects of omega-3s.

A 1995 *Wall Street Journal* article reported that use of rapeseed oil in cooking was associated with greatly increased rates of lung cancer in the women breathing the fumes.[22] Once again, a lack of saturates in the diet may explain the association, because the lungs can't work without adequate saturated fats.[23] In India, rapeseed oil has been used as a cooking oil for thousands of years, but only recently have Indian housewives been cajoled into the belief that saturated butter and ghee should be avoided. Many now use *vanispati*, an imitation ghee made of partially hydrogenated soybean oil.

PROCESSING

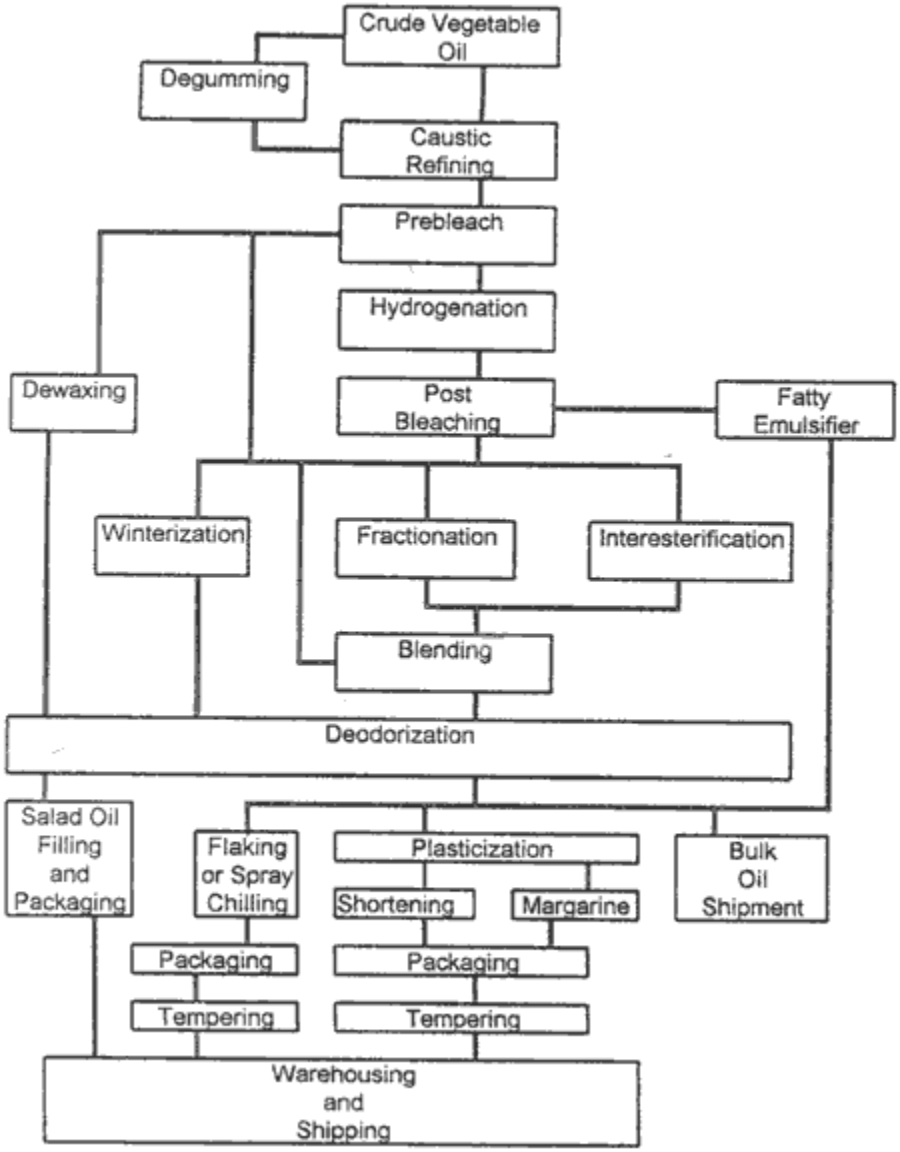
Rapeseed has been used as a source of oil since ancient times because it is easily extracted from the seed. Interestingly, the seeds were first cooked before the oil is extracted. In China and India, rapeseed oil was provided by thousands of peddlers operating small stone presses that press out the oil at low temperatures. What the merchant then sells to the housewife is absolutely fresh.

Modern oil processing is a different thing entirely. The oil is removed by a combination of high temperature mechanical pressing and solvent extraction. Traces of the solvent (usually hexane) remain in the oil, even after considerable refining. Like all modern vegetable oils, canola oil goes through the process of caustic refining, bleaching and degumming–all of which involve high temperatures or chemicals of questionable safety. And because canola oil is high in omega-3 fatty acids, which easily become rancid and foul-smelling when subjected to oxygen and high temperatures, it must be deodorized. The standard deodorization process removes a large portion of the omega-3 fatty acids by turning them into *trans* fatty acids. Although the Canadian government lists the *trans* content of canola at a minimal 0.2 percent, research at the University of Florida at Gainesville, found trans levels as high as 4.6 percent in commercial liquid oil.[24] The consumer has no clue about the presence of *trans* fatty acids in canola oil because they are not listed on the label.

A large portion of canola oil used in processed food has been hardened through the hydrogenation process, which introduces levels of *trans* fatty acids into the final product as high as 40 percent.[25] In fact, canola oil hydrogenates beautifully, better than corn oil or soybean oil, because modern hydrogenation methods hydrogenate omega-3 fatty acids preferentially and canola oil is very high in

omega-3s. Higher levels of *trans* mean longer shelf life for processed foods, a crisper texture in cookies and crackers–and more dangers of chronic disease for the consumer.[26]

FLOW CHART FOR EDIBLE OIL PROCESSING



THE MYTH OF MONOUNSATURATES

Consumer acceptance of canola oil represents one in a series of victories for the food processing industry, which has as its goal the replacement of all traditional foods with imitation foods made out of products derived from corn, wheat, soybeans and oil seeds. Canola oil came to the rescue when the promotion of polyunsaturated corn and soybean oils had become more and more untenable. Scientists could endorse canola oil in good conscience because it was a “heart-healthy” oil, low in saturated fat, high in monounsaturates and a good source of omega-3 fatty acids.

But most of the omega-3s in canola oil are transformed into *trans* fats during the deodorization process; and research continues to prove that the saturates are necessary and highly protective.

At least it can be said that canola oil is a good source of monounsaturated fat–like olive oil–and therefore not harmful. . . Or is it? Obviously monounsaturated fatty acids are not harmful in moderate amounts in the context of a traditional diet, but what about in the context of the modern diet, where the health-conscious community is relying on monounsaturated fats almost exclusively? There are indications that monounsaturated fats in excess and as the major type of fat can be a problem. Overabundance of oleic acid (the type of monounsaturated fatty acid in olive and canola oil) creates imbalances on the cellular level that can inhibit prostaglandin production.[27] In one study, higher monounsaturated fat consumption was associated with an increased risk of breast cancer.[28]

Even the dogma that monounsaturated fatty acids are good for the heart is at risk. According to a 1998 report, mice fed a diet containing monounsaturated fats were more likely to develop atherosclerosis than mice fed a diet containing saturated fat.[29] In fact, the mice fed monounsaturated fats were even more prone to heart disease than those fed polyunsaturated fatty acids.

This means that the type of diet recommended in books like *The Omega Diet*–low in protective saturates, bolstered with high levels of omega-3 fatty acids and relying on monounsaturated fatty acids, whether from olive or canola oil, for the majority of fat calories–may actually contribute to heart disease. Such diets have been presented with great marketing finesse, but we need to recognize them for what they are–payola for the food companies and con-ola for the public.

Sidebars

FATTY ACIDS

SATURATED FATTY ACIDS are chains of carbon atoms that have hydrogen filling every bond. In foods, they normally range in length from 4 to 22 carbons. Because of their straight configuration, saturated fatty acids pack together easily and tend to be solid at room temperature. Butter, tallows, suet, palm oil and coconut oil are classified as saturated fats because they contain a preponderance of saturated fatty acids. Saturated fats are stable and do not become rancid when subjected to heat, as in cooking.

MONOUNSATURATED FATTY ACIDS are chains of carbon atoms that have one double bond between two carbons and therefore lack two hydrogens. Normally they range from 16 to 22 carbons. They have a kink or bend at the position of the double bond so the molecules do not pack together as easily as saturated fatty acids. Monounsaturated oils tend to be liquid at room temperature but become solid when refrigerated. Olive oil, peanut oil, lard, rapeseed and canola oils are classified as monounsaturated oils. The most common monounsaturated fatty acids are palmitoleic (16 carbons), oleic (18 carbons) and erucic (22 carbons). Monounsaturated oils are relatively stable and can be used for cooking.

POLYUNSATURATED FATTY ACIDS have two or more double bonds. As there is a bend or kink at each double bond, these fatty acids do not pack together easily and tend to be liquid, even when cold. Polyunsaturated oils are very fragile. They tend to develop harmful free radicals when subjected to heat and oxygen, as in cooking or processing. Soybean oil, safflower oil, sunflower oil and flax oil are polyunsaturated oils. Omega-6 fatty acids have the first double bond at the 6th carbon from the end of the fatty acid chain. The most common omega-6 fatty acid is linoleic acid, which is called an

essential fatty acid (EFA) because your body cannot make it. Omega-3 fatty acids have the first double bond at the 3rd carbon. The most common omega-3 fatty acid is the EFA alpha-linolenic acid. The consensus among lipid experts is that the American diet is too high in omega-6 fatty acids (present in high amounts in commercial vegetable oils) and lacking in omega-3 fatty acids (which are present in organ meats, wild fish, pastured egg yolks, organic vegetables and flax oil). Surfeit of omega-6 fatty acids and deficiency in omega-3 fatty acids has been shown to depress immune system function, contribute to weight gain and cause inflammation.

SOYBEAN OIL VERSUS RAPESEED OIL IN INDIA

While canola oil is displacing soybean oil in many American processed foods, soybean oil is displacing traditional rapeseed oil in India. In her book Stolen Harvest, Indian author Vandana Shiva describes how American industrially processed soy oil replaced traditional seed oils in a large part of India. Each region in India has its specific edible oil used for cooking. In the North and East it is rapeseed oil, in the West it is peanut oil, in the Deccan it is sesame and in Kerala it is coconut. In India, rapeseed or mustard oil was traditionally sold in small quantities, extracted as needed with a small oil press or ghanis. Oil processing provided employment for thousands of artisans and ensured that the housewife had a fresh product. The oil cake was then fed to cattle (with no apparent negative effects). Mustard oil also served as mosquito repellent and as a nonpolluting oil in lamps.

Within a few months after the advent of “free trade” for soybean oil into India, thousands of Indians fell ill with “dropsy” due to a mysterious adulteration of rapeseed oil. The government banned the sale of all unpackaged edible oils, thus ensuring an end to all household and community-level oil processing. Edible oil production became fully industrialized and local processing became a criminal act. Thousands of workers were dispossessed of their livelihood and millions of Indians were dispossessed of a healthy oil. Cheap, highly processed soy oil immediately replaced rapeseed oil in the markets. During the crisis, the US Soybean Association pushed for soybean imports as the “solution.” “US farmers need big new export markets. . . ” reported one business publication. “India is a perfect match.” Growth was achieved by theft of an important part of the small-scale local economy.

GENETICALLY MODIFIED CANOLA

The first seed oil to be created through genetic manipulation, canola is also the focus of a variety of genetic engineering (GMO) projects in which genetic material from other species is inserted into the seeds in order to magnify certain traits in the resultant plant. Herbicide-resistant GMO canola now comprises a large portion of the total canola crop. Apologists point to endorsement by the FDA and the American Dietetic Association that GMO canola is nutritionally and environmentally safe and claim that the GMO variety means less spraying of herbicides, less chemical runoff and a boon to farmers.

Percy Schmeiser, a third generation Saskatchewan farmer, found out the hard way that GMO canola may not be a boon to farmers. Pollen from Monsanto’s patented GMO canola seeds blew onto his land from neighboring farms– unlike grains, rape and canola plants spread their pollen on the wind. Monsanto’s “gene police” then invaded his farm and took seed samples without his permission. Because Schmeiser did not spray his crop with herbicides, a Canadian court ruled that he had taken advantage of Monsanto’s GM technology. Schmeiser was ordered to pay $10,000 for licensing fees and up to $75,000 in profits from his 1998 crop.

Meanwhile, genetic engineers are involved in projects to make canola oil “even more nutritious,” by further reducing the amount of saturates in the fatty acid profile and raising the levels of monounsaturates. This, they claim, will make it possible to reduce the amount of trans fats in the processed oil, presumably because levels of omega-3 fatty acids, which need to be deodorized, will also be lowered. Should the genetic engineers be successful, it might be possible to create a diet in which the vast majority of fatty acids is monounsaturated, something that does not exist in any traditional diet anywhere in the world. (Source: Eric Peters, “Let them eat canola,” *Washington Times*, 4/29/2002.)

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