

SUSTAINABLE LIVING GUIDE

3. PESTICIDES IN OUR FOOD

Introduction

Although government agencies say that consuming pesticides in low amounts doesn't harm you, many studies have shown an association between pesticides and health problems, such as cancer, attention-deficit (hyperactivity) disorder, and nervous system disorders. Exposure to pesticides is also thought to weaken the human immune system. We are hearing more and more that our lackadaisical approach to regulation may have far-reaching consequences for our health. We are also hearing more and more about giving preference to food grown without pesticides, chemical fertilizers and growth hormones.

How Little We Know

How would you like a dose of 67 pesticides with your celery? If you're eating non-organic celery, that's the number of pesticides you may very well be ingesting. According to the 2010 edition of Environmental Working Group's Shopper's Guide to Pesticides,¹ the top twelve pesticide-contaminated fruits and vegetables contain 47 to 67 different pesticides per serving. This year celery is starring in the No. 1 spot (up from No. 4 last year), peaches moved down, and there are a few new contenders on the list.

EWG² has analyzed nearly 100,000 produce pesticide reports from the USDA and the FDA, and then determined what fruits and vegetables contain the highest, and lowest, amounts of chemical residue and have presented the information in a handy shopper's guide. Shoppers can use the list in two ways. If you are unable to buy organic produce, avoid the 'Dirty Dozen' and instead opt for the 'Clean 15.'

If you can buy limited organic, purchase organically-grown items from the Dirty Dozen, and continue buying non-organic selections from the Clean 15. Of course, in a perfect world we wouldn't be contending with pesticides in our food at all, but in this imperfect world at least we have some tools to help navigate around the n-methyl carbamates and organophosphate pesticides. Most consumers do not know that some of the most commonly used pesticides today were originally derived from nerve gasses developed during World War II.

The pesticide tests used for gathering this information were conducted after the food had been power-washed. Although some pesticides are found on the surface of foods, other pesticides may be taken up systemically through the roots and into the plant and cannot be removed. Thus, washing the produce is not an effective fix. EWG maintains that, by avoiding the twelve most contaminated fruits and vegetables, pesticide consumption can be lowered by nearly **80%**. So, at least that's a start.

¹ Environmental Working Group. 2010 Shopper's Guide to Pesticides (www.foodnews.org).

² Environmental Working Group. Washington, DC (www.ewg.org).

The Dirty Dozen

Try to buy these twelve fruits and vegetables as organically-grown produce. Fortunately, everything on the list can be grown locally (so we can avoid ‘imported’ grapes). But also know that many small farms can’t sustain the paperwork and fees to be certified organic, even though they practice organic methods. If you shop at a farmer’s market and want to buy products not listed as organic, ask the vendor anyway: there’s a good chance the produce was grown without the use of pesticides. The dirty dozen (with No. 1 being the worst) include the following:

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| (1) Celery | (5) Domestic blueberries | (9) Cherries |
| (2) Peaches | (6) Nectarines | (10) Potatoes |
| (3) Strawberries | (7) Sweet bell peppers | (11) Imported grapes |
| (4) Apples | (8) Spinach, kale and collard greens | (12) Lettuce |

Apart from the imported grapes, all of the other items on the Dirty Dozen list are grown here on Vancouver Island or in other parts of British Columbia (e.g., Fraser Valley, Okanagan). Given the amount of grape-growing on Vancouver Island, the Fraser Valley, and in the Okanagan, we can eat fresh, organically-grown grapes for a period in the late summer, early autumn. Thus, if we eat seasonally, most of the items on the list are available as locally-grown organic produce.

The Clean 15

Produce with a strong outer layer seems to have defense against pesticide contamination. Although buying only organic is the first choice, if you are unable to do so, EWG recommends these non-organic fruits and vegetables which contain little to no pesticides, No 1 being the cleanest:

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| (1) Onions | (6) Sweet peas | (11) Cantaloupe |
| (2) Avocados | (7) Asparagus | (12) Watermelon |
| (3) Sweet corn | (8) Kiwi fruit | (13) Grapefruit |
| (4) Pineapples | (9) Cabbage | (14) Sweet potatoes |
| (5) Mango | (10) Eggplant | (15) Sweet onions |

Again, apart from the tropical or warmer-climate fruits (avocados, pineapples, mangoes, and grapefruit), the others on the list are grown here on Vancouver Island.

While choosing organic versions of the produce found on the Dirty Dozen list is certainly a move in the right direction, it's also important to understand that eating non-organically grown fruits and vegetables listed on the Clean 15 list could still subject you to exposure to harmful chemicals. Toxic chemicals aren't just lurking on the outside of non-organic fruits and veggies, but actually inside them, too. The fat- and water-solubility properties of the pesticides and the non-ionic solvents and surfactants used allow the chemicals to enter every cell in the produce, and thus to every cell in your body. This is a very serious matter, especially since we know that our own hormone systems respond to chemicals in the parts per trillion range.

Better Living Through Chemistry?

Although dozens of pesticides are used to grow our food, manufacturers are not required to test for a chemical's impact on learning or aggressive behavior, or its effect on sexual behavior, immune function, or shifts in hormones or fetal development patterns, all things that research has shown will clearly affect health during one’s lifespan. The entire government-agency-

registration process is functionally a bait-and-switch process – what the public buys off the shelf is *not* what is registered. Only the active ingredient, in ultra-pure form, is ever tested. All the other supposed ‘inert’ ingredients can make the chemical more toxic than originally believed. Furthermore, the government-registration process is not one that considers safety as much as it should.

As with most things reviewed, the decision as to whether or not to register a product seems to be based on economic criteria, not safety. For example, products are not tested for how they affect gene expression and activity – there is significant concern now that we may be affecting generations yet unborn because of potential impacts on the way our genes are expressed, and the possibility that we could pass these changes on to subsequent generations. **Some doctors warn that children's growing brains are the most vulnerable to pesticides in food.** These kinds of effects are starting to be demonstrated for a number of environmental chemicals, not just pesticides.

Chemical pesticides affect us in other ways, too. We are hit with a double-whammy exposure when they wind up in our food and wash off fields into our drinking water supplies. The production, transportation, and application of farming chemicals are the most energy-intensive parts of conventional agriculture. Aside from that, pesticides kill beneficial, carbon-storing microorganisms in the soil, reducing soil quality, and opening the doors up for more plant diseases and difficulties surviving during droughts.

Many pesticides are derived from chemical warfare agents re-purposed to kill insects (e.g., diazinone). The herbicide, Agent Orange (developed by Monsanto, maker of the most widely-used herbicide, Roundup), was used in the Vietnam War in the herbicidal warfare program – a form of chemical warfare meant to destroy terrestrial ecosystems, agricultural food production, and plant cover. Many Vietnamese people were exposed to Agent Orange, resulting in approximately 400,000 deaths and disabilities, and 500,000 children born with birth defects.

Main Sources of Unhealthy Chemicals in Our Food

Chemicals used in pesticides and fertilizers. Although the use of pesticides has made our food production more efficient, it has placed a huge/large toxic burden on us and the earth. Billions of kilograms of pesticides are sold worldwide each year. Food inspections in North America have found legal levels of residues from approved pesticides on two-thirds of food sampled. There is no question that these pesticides persist on and in our food.

Chemicals used in the production of our food. Over 12,000 chemicals are used in the production of our food. Many are used intentionally as “direct” additives, but some are “indirect” contaminants or used accidentally. Complete health and environmental risk assessments are available for only a very low percentage of food additives. The food industry uses about 3,000 different food additives in various packaged and preserved foods. These include: preservatives, emulsifiers, buffers, natural and artificial colourings, and flavourings.

Chemicals and drugs used in raising livestock. Researchers feel that this is probably the biggest problem and none of these chemicals is required to be included on the label. Over 70% of all antibiotics used in the North American industry are used in raising livestock to prevent infection because the animals are kept in cramped and inhumane conditions. Steroids are also used to increase milk production and speed animal growth. The feed given to these animals is full of chemicals as well, resulting in pesticides and chemicals accumulating in the fat of these

animals that then end up in our diet. So, if you do eat dairy or animal protein, eating organic is important to decrease your chemical burden.

Chemicals we create in processing foods. Trans fats or hydrogenated fats are the most common.

Contaminants associated with processing of foods. During shipping and storage, chemical cleaners, food sprays and fungicides are used.

Chemicals absorbed into our food from the way we cook, store and serve our food. Non-stick pans, pots, bake-ware and utensils contain Teflon, a substance is made from perfluorinated compounds which have been linked to cancer and reproductive problems. And then we store and serve our food in containers that leach chemicals into our food, e.g., plastics and styrofoam.

Does Washing Help?

All fresh produce, whether it's grown with or without pesticides, should be washed with water to remove dirt and potentially harmful bacteria. And health experts agree that when it comes to the Dirty Dozen list, choose organic produce if it's available. Chemical-based farming causes problems we can't wash away. It's common knowledge that conventional fruits and vegetables are contaminated with pesticide residues on their skins and peels. But what many people don't realize is that pesticides are actually *inside* the food, too. The pesticide tests mentioned above were conducted by the USDA after the food had been power-washed. Also, although some pesticides are found on the surface of foods, other pesticides may be taken up through the roots and into the plant and cannot be removed.

Thus, washing may not do enough – peeling of the vegetables and fruits may help but there is no assurance that what is left is pesticide-free. After several generations of usage, pesticide residues are found just about everywhere – in soils, ground water, surface waters, and in terrestrial and aquatic vegetation. Thus, even if a fruit crop is not sprayed with an insecticide or fungicide, for example, there can be chemical residues in the fruit because of previous chemical deposition in the soil.

To the extent possible, we should simply buy and eat organically-grown fruits, vegetables, nuts, and whole grains because research has shown that people who eat mostly organic food reduce 95% of the pesticides in their bodies in about a two-week period.

Lowering the Personal Pesticide Load

Demand Organic

Eating organic foods dramatically lowers the amount of disease-causing pesticides in your body. It is important to learn as much as possible about: (i) the quality differences between organically-grown and non-organically-grown produce, (ii) how organic gardeners and farmers operate and grow their produce, (iii) the seasonal availability of fruits and vegetables, and (iv) local organic food cooperatives.

Eat Whole

The two ingredients found in most processed foods in one way or another – genetically engineered corn and soy – likely contain more pesticides because the plants are genetically engineered to survive sprayings of plant-killing glyphosate (Roundup). The problem is that the overuse of pesticides (much like we're seeing with antibiotics) is leading to pesticide-resistant super-weeds, forcing farmers to use higher doses of the poison on our crops, and even to 'stack' pesticides, i.e., using several different types on a crop. Cutting back on processed foods will reduce your exposure. Remember to go for organic whole foods, since you'll likely find chemicals inside conventional whole fruits and vegetables.

Eat Seasonally

In British Columbia, we have a winter which puts a hold on gardening and farming throughout most of the province. Such vegetables as the root crops (e.g., potatoes, rutabagas, beets, parsnips, carrots, and onions), and some fruits (e.g., apples, kiwis, bosc pears) can be stored over the winter throughout most of the province (root cellars, cold storage). But in southwestern British Columbia, we are seeing more and more fresh vegetables being produced, over the winter, in fields (e.g., salad greens, leeks, spinach, kale, chard, onions, broccoli, cauliflower, and cabbage) and in greenhouses (e.g., tomatoes, cucumbers, sweet peppers, salad greens).

If it is necessary for fresh peaches, strawberries, blueberries, nectarines, cherries, grapes, pineapples, mangoes, eggplant, watermelon, cantaloupe, and sweet corn to be part of your daily diet, then be prepared to ignore the discussion on pesticides and/or to pay a premium price for organically-grown imports.

Save Money on Organic

You can afford organic. The trick is to cook with whole, organic ingredients (soups and Crock-Pot recipes are quick and easy ways to do this). Visit the local farmers' market and buy organic in bulk; one can then can or freeze extra tomatoes, pickle cucumbers and beans, freeze herbs, freeze berry fruits, or make jam or jelly. Another great way to save money and afford organic is to reduce the amount of meat, particularly processed meat, in our daily menu. Opt for organic quinoa, lentils, or dried organic beans as super-cheap, healthy protein sources, and save organic meat for special occasions. To really save money and to realize other health benefits, there is the option for many people to grow their own organic vegetable and fruit garden.

We Are Immersed in a Chemical Soup

According to Nena Baker,³ we are running a "collective chemical fever" which we seemingly cannot break:

"Everyone everywhere now carries a dizzying array of chemical contaminants, the by-products of modern industry and innovation, which contribute to a host of development deficits and health problems in ways just now being understood. These toxic substances, unknown to our grandparents, accumulate in our fat, bones, blood, and organs as a consequence of womb-to-tomb exposure to industrial compounds as

³ Baker, N. 2008. The body toxic. How the hazardous chemistry of everyday things threatens our health and well-being. North Point Press, New York, NY. 277 p.

common as the products what contain them. Almost everything we encounter – from soap to soup cans, computers to clothing – contributes to a chemical load unique to each of us. Scientists studying the phenomenon refer to it as ‘chemical body burden.’”

Scientists estimate that everyone alive today carries within her or his body at least 700 contaminants, most of which have not been well studied.⁴ This is true whether we live in a rural or isolated area, in the middle of a large city, or near an industrialized area. Defoliants or pesticides used in Central or South America, for instance, can quickly catch air currents and be brought to other countries across the globe. There are chemicals that have been banned for use in some countries but are still being used in other countries. Because many chemicals have the ability to attach to dust particles and/or catch air and water currents and travel far from where they are produced or used, the globe is bathed in a chemical soup. Our bodies have no alternative but to absorb these chemicals and sometimes store them for long periods of time. Wherever we live, all our bodies are receptacles for a multitude of industrial chemicals – we all live in a chemically-contaminated neighborhood.

Some of the chemicals residing in our bodies are pesticides, and some are used in or produced by other forms of industrial production. Many are found in a wide variety of consumer products. Some chemicals, such as dioxins and furans, are created unintentionally by industrial processes using chlorine, and from the manufacture and incineration of certain plastics. Scientists estimate that there are many other unintentionally created by-products which have not yet been "discovered" since no tests have yet been developed that would fully identify or describe these by-products.

Humans are exposed to chemicals through the food we eat, the air we breathe, and the water we drink and in which we bathe. Chemicals often coat the surface of dust particles, which we handle or inhale. Contaminated dust is an especially important route of exposure for children who commonly put their hands into their mouths. We are also exposed to hundreds of chemicals in everyday products we use. Paints and varnishes, gasoline, glues, cosmetics, clothes dry-cleaned with solvents, plastic food containers, and home and garden pesticides are just a few examples. The chemical landscape created as a result of intensive and continuing chemical use during the 20th century has been internalized.

Because the chemicals found within our bodies are not labeled with return addresses, it is difficult to identify their origins. For example almost all of the dioxin found inside our bodies came from our eating contaminated food. However, it could have originated in a local medical waste incinerator or it may have been created by a distant, chlorine-based, paper manufacturing plant located thousands of miles from our homes. Whatever its source, somewhere it entered the food chain and made its way into the food we ate. Similarly, a pesticide found inside our bodies may have come from pesticide spraying done at a local school, in your garden or kitchen, or it may have arrived on foodstuffs grown with pesticides in the U.S., South America, Asia or somewhere else abroad. Its origin will be difficult to identify.

Another source of exposure is the chemical body burden of our mothers. During pregnancy, the chemicals stored in a woman's body have the ability to cross the placenta where they may cause harm. Some chemicals from a mother's body are also mobilized and transferred to the breasts as she produces breast milk. These chemicals are then transferred to the baby during breastfeeding. Breast milk remains the best food for babies, as recent studies show, because of

⁴ Onstot J, R. Ayling and J. Stanley. 1987. Characterization of HRGC/MS Unidentified Peaks from the Analysis of Human Adipose Tissue. Volume 1: Technical Approach. Washington, DC: U.S. Environmental Protection Agency Office of Toxic Substances (560/6-87-002a).

its immunological, nutritional and psychological benefits. The fact that industrial chemicals have contaminated breast milk is tragic. Ironically, breastfeeding appears to offset some of the damage created by contaminants during fetal development. Some of the chemicals we receive from our mothers *in utero* and through breastfeeding remain with us for years, an unintended legacy that our mothers pass on as their body burdens become our own.

Household Chemicals

That lemon-scented dish liquid you've been using doesn't have any lemons in it. That lemony scent is a combination of hundreds of different chemicals that may be interfering with our hormones, building up in our bodies, or reacting with other chemicals in our living space to create formaldehyde. A new report published by the non-profit advocacy group, Women's Voices for the Earth (WVE),⁵ outlines the potential hazards posed by these perfume and fragrance "cocktails." The report finds that these chemical fragrances, in a word, stink.

Earlier this year, WVE received a list from the International Fragrance Association of all the chemicals used in perfumes and fragrances added to everything from candles to baby shampoos to cleaning products. WVE then examined the list for chemicals that pose potential health risks. The list contained 3,100 chemicals used in various combinations (a single fragrance can contain hundreds of chemicals) to make your shampoo smell like raspberries or your dishwashing detergent smell like jasmine.

Many of these chemicals are potentially hazardous. For example, the report focused on one specific class of chemicals called synthetic musks. They were originally created to mimic the natural musks emitted by musk deer and musk ox. The problem is that synthetic musks can accumulate in body fat and act as hormone disruptors. More disturbingly, animal studies have shown that musks can make cells less able to defend themselves against toxic chemicals. Synthetic musks have also triggered the proliferation of breast-cancer cells in lab tests. Finally, according to research, synthetic musks show up in 70% of newborns tested, likely because the musks build up in women's breast milk.

Synthetic fragrances may also contain phthalates, a class of hormone-disrupting chemicals which help make scents last longer. Phthalates have been linked to obesity and **learning disorders in children**. Chemicals in perfumes and fragrances may also give off volatile organic compounds (VOCs) that essentially pollute the **indoor air**. These VOCs have been linked to liver, kidney, and neurological damage.

The WVE report did acknowledge that some large companies, including S.C. Johnson and The Clorox Company, have removed all musks and phthalates from their products and replaced them with alternatives, but, at the same time, they're keeping the alternatives secret. That secrecy is the biggest problem if the consumer wishes to avoid these ingredients. Normally, if fragrance is listed at all, it's listed just as "fragrance." The individual components are considered trade secrets. For now, the best way to avoid potentially harmful fragrances is to avoid fragrances. Since that is not always easy to do, there are a few things we can do.

Fragrance-Free. Opt for "fragrance-free" rather than "unscented" – the two are not the same. To make a product "unscented," companies often add a fragrance to mask the smell of the chemicals in that product. Look for an ingredients panel to see if "fragrance" is listed. If there

⁵ www.womenandenvironment.org/campaignsandprograms/SafeCleaning

isn't one, look for the "fragrance-free" label, which is a more accurate indication than "unscented."

Nature's Clothes Dryer. Hang the laundry outside and allow the actual fresh morning breeze from outside to dry the clothes. Plus, line-drying laundry saves tons of energy. There are lots of recipes for homemade cleaning products which can be scented with pure essential oils, not synthetic musks.

Complain. Call the company that manufactures the product. If spending a morning without one's favorite citrus-scented body wash brings on some anxiety, by all means call the company and find out what's used in the product. The representatives may not reveal exactly what's in the fragrance mix, but they can tell if they use synthetic musks or phthalates.

Mosquito Alert!

DEET-based mosquito repellents (DEET stands for diethyl-meta-toluamide) have recently been linked to brain cell damage.⁶ Duke University research has shown that regular use of chemical repellents, such as DEET, may damage brain cells and interact with medications. The pharmacologist conducting the study observed brain cell death and behavioral changes in animals exposed to DEET after frequent and prolonged use. Another study showed that up to 15% of DEET is absorbed by the skin into the bloodstream.

After more than 30 years of research on the effects of chemicals on the brains of rats, Mohamed Abou-Donia discovered, in two separate studies, that the frequent and prolonged applications of DEET caused neurons to die in regions of the brain that control muscle movement, learning, memory and concentration. Moreover, rats treated with a comparable human dose of DEET performed far worse than control rats when challenged with physical tasks requiring muscle control, strength and coordination. Such effects are consistent with physical symptoms in humans reported in the medical literature, especially by Persian Gulf War veterans.⁷

So what do you do if you wish to avoid the potentially dangerous effects of DEET while still keeping the mosquitoes at bay? Mother Nature offers a number of different options which are some of the more effective repellents:

Citronella. An old standby but use *only* pure essential oil of citronella, not fragrance oil. Oils purchased in bulk for burning are not adequate for applying topically to your skin. For your skin it is best to get a high quality citronella essential oil from a natural food store.

Soy oil. The *New England Journal of Medicine* reported that natural repellents made of soybean oil are just as effective as DEET-containing repellents. Soy oil is inexpensive and easy to find, making it an excellent choice. Plus, it is an excellent body moisturizer.

Catnip. An Iowa State University research group has shown that the essential oil found in the herb catnip is about ten times more effective than DEET in repelling mosquitoes in the laboratory.

⁶ Abou-Donia, M. 2002. Caution advised when using DEET. Inside 11(16). Duke University Medical Center & Health System Employee Newsletter. www.inside.mc.duke.edu/article.php?IssueID=348ParentID=1054

⁷ Abou-Donia, M.B., H.B. Suliman, A.K. Wasuiddin, and A.A. Abdel-Rahman. 2003. Chemicals used to protect soldiers in 1991 Gulf War can damage testes, animal studies show. Duke Medical Center & Health System. www.hartford-hwp.com/archives/27c/o68.html

Neem seed oil. Also known as ‘neem oil,’ it is extracted from a plant which grows in India. An ingredient in Neem seed oil has also been found to be more effective than DEET by researchers at the Malaria Institute in India. Both the US National Research Council and the Journal of the American Mosquito Control Association have confirmed this finding.

Lavender essential oil. This commonly used oil smells great and is an effective mosquito repellent.

Garlic. Eat lots of fresh garlic – mosquitoes apparently can’t stand the stuff.

Be Vigilant

It has become apparent that no one will look out for our personal and collective health and well-being as well as we can ourselves. Governments seem reluctant to step in the way of the multi-national corporations that promote the usage of fossil-fuel-based agricultural chemicals, and that are trying to assume global control of the food-growing industries. The onus always is placed on the end-user to prove that something unnatural is harmful to either the natural environment or human health or both. These industries have no sense of a social contract, no sense of obligation to be concerned first and foremost with human health and well-being. It seems that corporatism has pervaded one more of the essentials for human life, our food – much the same as it has other essentials for life, such as clean air and clean water.

Make no assumptions about our food – its origins, its quality, its nutritional value, and its cleanliness. Don’t be afraid to ask questions of the local grocers, the local farmers and market gardeners – demand the best from them and reward them if they provide what you have demanded.

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