

Pesticides and You

News from Beyond Pesticides: Protecting Health and the Environment with Science, Policy & Action

Volume 32, Number 2

Summer 2012

Back to the Future

Communities are doused with pesticides
in response to West Nile virus

Also in this issue:

**A Call to Action 50 Years
After *Silent Spring***

**Controversy Over Processed
Organic Foods**

Back to School Guide

**New ChemicalWatch
Factsheet on Indoxacarb**



On the 50th Anniversary of *Silent Spring*, A Call to Action

Rachel Carson's landmark book, *Silent Spring*, was published in 1962—50 years ago. We celebrate and reaffirm the teachings and message of the book as critical to sustaining life.

In this year, I had the opportunity with the staff and board of Beyond Pesticides to visit Yale University's Beincke Rare Book and Manuscript Library and view Rachel Carson's papers, which includes her letters, papers, and scrapbook with articles about *Silent Spring* that she had clipped, and other documents of the time that related to the topic of pesticides. To a large extent, the work of Beyond Pesticides carries on Rachel Carson's legacy—so to feel her presence, strength, vision, and bravery was a powerful moment. And what better time to touch Ms. Carson's spirit than on the 50th anniversary of *Silent Spring*. With an acknowledgement of her contribution to launching the conservation and environmental movement, in March we held the 30th National Pesticide Forum, *Healthy Communities*, at Yale's School of Forestry and Environmental Studies. (See talks from the conference on the Beyond Pesticides' YouTube channel.)

I also took the occasion of the 50th anniversary to re-read *Silent Spring*. The book is especially important for those who may think that blanket pesticide spraying for food production or insect-borne diseases might at times be necessary and effective, since it reaffirms the importance of thoughtful biology-based strategies that prevent and solve pest problems, rather than exacerbate them. Ms. Carson writes, "[T]he method of massive chemical control has had only limited success and also threatens to worsen the very conditions it is intended to curb." The book certainly has relevancy to today's chemical assault in the wake of both the Centers for Disease Control and Prevention's (CDC) and numerous communities' response to managing the mosquito-borne West Nile virus. (See page 15 in this issue.)

Respecting Nature

Silent Spring is a clarion call for caution, written during the then-emerging chemical age of the 1950's. Ms. Carson introduces the book with her science-based understanding that, "The most alarming of all man's assaults upon the environment is the contamination of air, earth, rivers, and sea with dangerous and even lethal materials." The book catalogs the severe problems associated with our societal embrace of DDT (at that time) and other chlorinated hydrocarbons, organophosphates, carbamates, and phenol as effective and protective tools in managing unwanted insects and vegetation in agriculture, gardens, and homes. Ms. Carson, a marine biologist,

science writer, poet, and author, instructed us to respect nature, support it, harness the benefits it offers to us, and never think that we can overpower it. The real-world examples that she provides in *Silent Spring* are stunning, from impacts on salmon, aquatic organisms, birds, beneficial insects, to humans. She warns us about pesticide uses related to rangeland, utilities' brush control, forestry, agriculture, private lawns, parks, and golf courses.

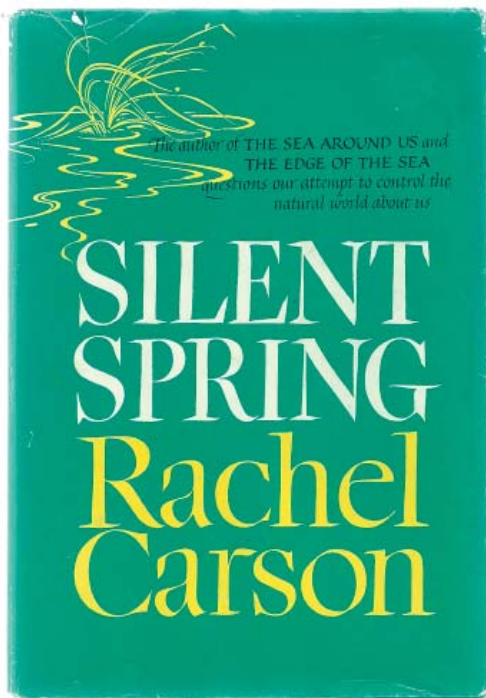
One cannot write off this book as outdated. Quite the contrary. Ms. Carson has given us a life-long guide to understanding the effects of chemical-intensive practices, the importance of our relationship to nature, understanding chemical effects at the cellular level and resulting cancer, neurotoxic, genetic, and reproductive effects, and insect and weed resistance to chemical controls. Most importantly, she gives us a framework for moving us off the chemical treadmill.

Soil and Organic Practices

The case for our individual and collective commitment to growing the organic sector is laid out in *Silent Spring*. And, the *Organic Foods Production Act*, like *Silent Spring*, zeros in on the importance of protecting and nurturing the soil. Noting that, "[T]he most essential organisms in soil are the smallest—the invisible hosts of bacteria and of threadlike fungi," Ms. Carson writes, "[I]f our agriculture-based life depends on the soil, it is equally true that soil depends on life, its very origins and the maintenance of its true nature being intimately related to living plants and animals." She continues, "What happens to these incredibly numerous and vitally necessary inhabitants of the soil when poisonous chemicals are carried down into their world, either introduced directly as soil "sterilants" or borne on the rain that has picked up a lethal contamination as it filters through the leaf canopy forest and orchard and cropland? Is it reasonable to suppose that we can apply a broad-spectrum insecticide to kill the burrowing larval stages of a crop-destroying insect, for example, without also killing the "good" insects whose function may be the essential one of breaking down organic matter? Or can we use a nonspecific fungicide without also killing the fungi that inhabit the roots of many trees in a beneficial association that aids the tree in extracting nutrients from the soil?"

This subject, of course, does not pass without attention to the value of earthworms and bees and other pollinators. Ms. Carson criticizes the lack of attention to protecting vegetative growth, along roadsides and fields, and fears the lack of importance given to the 65

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House Fly Invasion

Please help, there is an invasion of house flies in my house, and my husband and I are getting tired from all the swatting that we've been doing. I think that the farm near our house might be the source of them, but I can't be sure.

Rhonda

Hi Rhonda,

Thank you for contacting Beyond Pesticides. I hope we can provide you with some useful information to deal with your fly problem.

The first thing you should do is identify which particular fly pest species you are dealing with, because different species have different breeding sites and are attracted to different things. Extension agencies are a great place to get identification information. Almost all nuisance fly species are best controlled by eliminating larval developmental sites and reducing adult attractants in the vicinity of buildings or other areas of concern. Attractive material (such as garbage cans) should always be placed at some distance from a building entrance, and barriers such as screens, doors, and air curtains should be used to prevent flies from entering buildings.

Generally speaking – the following steps should help you get rid of your fly problem:

1. Identify the source
2. Eliminate the source
3. Seal up any outside entrance-ways
4. Control the remaining population

If you are able to identify and eliminate the source, control of the remaining population can be handled with non-toxic fly paper (homemade or commercially bought) and a fly swatter. Homemade fly-paper can be made by boiling water, sugar and corn syrup together, then spreading the extra-sticky mixture on brown paper



grocery bags.

A quick note - depending on the species of fly, the source may be a dead rodent inside the wall. University of Nebraska's Extension Office States: "A dead animal carcass will produce a flush of flies. One common source is a mouse in a forgotten mouse trap or dead inside the walls after eating mouse poison." This is just one particularly good argument against the use of rodenticides for mice inside the home.

Successful Mosquito Abatement

I just wanted to thank you for the amazing resources posted on your site. A small group of us were able to stop mosquito abatement fogging (for this year) in our small rural town of Ephraim, UT because of the fantastic research and resources available to us through your organization. We were able to make a thorough and convincing presentation to our city council.

The strategy tools listed on the website were invaluable in terms of helping us to organize ourselves, our data and our approach. Thanks again to all those who have contributed to make this possible!

Amy

Hi Amy,

We're so happy to hear that our tools helped you in your efforts. It's especially wonderful to hear about success stories - this is exactly why we are here. If there was anything (documents, strategies) you found particularly effective, or if you think we could improve on anything, please let us know!

There is a feature story in this issue of *Pesticides and You* with some new information on how to control mosquitoes without harmful chemicals, as well as helpful organizing information. Please check this out on page 15. All of our fact sheets, organizing tools, model policies and more can be found at www.beyondpesticides.org/mosquito.

Get Printed!

Beyond Pesticides always welcomes your questions, comments or concerns! Have something you'd like to share or ask us? We'd like to hear about it! If we think something might be particularly useful for others, we will print your comments in this section. Mail will be edited for length and clarity, and unless you specify otherwise, your contact information will remain anonymous.

There are many ways you can contact us. Join other members and activists in discussions on our facebook page facebook.com/beyondpesticides or follow us on twitter twitter.com/bpncamp! And as always, you can send questions and comments to: 701 E Street SE, Washington, DC 20003, or info@beyondpesticides.org.

From the Web

Beyond Pesticides' Daily News Blog features a post each weekday on the health and environmental hazards of pesticides, pesticide regulation and policy, pesticide alternatives and cutting-edge science, www.beyondpesticides.org/daily-news-blog. Want to get in on the conversation? Become a "fan" by "liking" us on Facebook! www.facebook.org/beyondpesticides.

EPA Asks for Public Comment on Petition to Ban Pesticide Deadly to Bees, Senators Urge Expedited Action

Excerpt from Beyond Pesticides' original blog post (6/30/2012): The U.S. Environmental Protection Agency (EPA) has opened a 60-day public comment period on the agency's decision to deny the request by beekeepers to immediately suspend the use of clothianidin, a pesticide that poses harm to pollinators.

From Joseph

Has everyone gone insane? When did it become OK to destroy so many things in the name of 'progress'!?

We have lost our connection to the natural world for the sake of convenience, and we create divisive technologies that, instead of enhancing our life and society, undermine it at every turn.

We don't need to poison ourselves anymore. We need to stop the madness and tell these 'agro-chemical' companies to stop destroying our planet, our nature, and us, for the sake of money, because we all know that the bottom line is the bottom line, and it's all a disgusting corporatized mess. Please send a message to these entities that we don't want their poison on our ground, in our food, in our air, or anywhere any more!!

From Suzanne

I want our beekeepers to have what they asked for...simple no harmful pesticides that endanger the bees. If we harm the ecosystem, it will harm us. Why is that so hard to comprehend. I want us to all act responsibly and harm none. We should not be a country of for-profit only. We should be a country that is based on a strong work ethic as I once believed we all shared. Let us preserve our health...ban harmful pesticides that inhibit our health and prosperity. Without our health we have nothing. Look at those who contract cancers and no amount of money can save them. Sad, very devastating. Let not an illness be caused by what man has created in the environment in which we live our lives for there is a huge penalty that cannot be reversed.

From Joanna

There is substantial evidence that clothianidin is mortally killing the very essence of food pollination. This is a CRISIS that must be stopped immediately. Colony Collapse Disorder, or whatever name you put to it, is an enormous calamity. Clothianidin is causing environmental damage and devastation to crops and nature. Eventually, if not already, causing death to animals, humans, and the planet we call HOME.

From J

If the EPA cannot afford to follow up on "conditional registrations" and pressure recipients to do the required field testing of ENVIRONMENTAL POISONS then, perhaps EPA can suspend granting such registrations until the applicants self-fund the required studies through designated, neutral university and organizational research facilities. Please remember that EPA is an acronym for Environmental PROTECTION Agency not Business Environment Protection Agency...you are not BEPA!

From John

Well, seeing as how we need bees to survive, and we don't need pesticides to survive, the choice should be pretty clear. If anything is even remotely doing harm to wildlife of any kind, it should be stopped and banned immediately. It shouldn't take until after 2018. I mean technically if you use a product you know could harm bees and the power in control of stopping that act doesn't do its job, every one involved should be held criminally accountable. 30% of the bee population? Seriously? Come on guys. This is not a game. This is the place where we all live, and this impact is and will be global.

EPA Publishes Human Health Benchmarks for Pesticides in Water

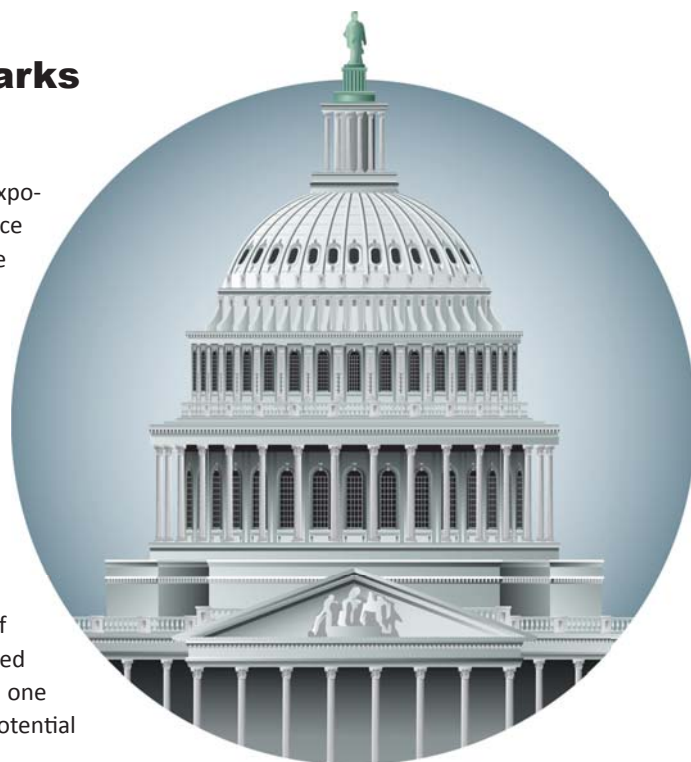
In the face of both widespread pesticide contamination in U.S. waterways and a lack of drinking water standards for hundreds of pesticides, the U.S. Environmental Protection Agency (EPA) announced new health and environmental benchmarks for acute and chronic exposures to pesticides in drinking water and its sources for the nation's most sensitive residents, including children and pregnant women.

EPA notes in its April 2012 factsheet, "The benchmarks are for pesticides for which the agency has not previously issued a drinking water health advisory or set an enforceable federal drinking water standard. These benchmarks for pesticides will enable states, water systems, and the public to better determine whether the detection of a pesticide in drinking water or source waters for drinking water indicate a potential health risk." While the benchmarks are a step forward in identifying hazards associated with pesticide use and exposure, they are deficient in not fully assessing risks because of ongoing limitations in analyzing the complexities

associated with chemical exposures. Of specific importance is EPA's failure to evaluate the issues of chemical mixtures, synergistic effects, and health impacts associated with chronic low-dose exposure. According to government studies, 56% of streams sampled have one or more pesticides in water that exceed at least one aquatic-life benchmark. Similarly, more than 20% of private domestic wells sampled nationwide contain at least one contaminant at levels of potential health concern.

Exceeding these new benchmarks consistently should indicate that human health and aquatic life may be at risk from continued exposures. However, since oversight and enforcement is lacking at both the federal and state level, pesticide contamination will continue to plague U.S. waterways. The publication of these new

benchmarks follows the March 2010 announcement by EPA Administrator Lisa P. Jackson of a new drinking water strategy that outlines principles to expand public health protection. Included in these principles is the decree to use the authority of multiple laws to more effectively protect drinking water.



Bill to Ban Atrazine Reintroduced in Congress

In late March, U.S. Representative Keith Ellison (D-Minn.) reintroduced legislation, "To prohibit the use, production, sale, importation, or exportation of any pesticide containing atrazine." Atrazine is used nationwide to kill broadleaf and grassy weeds, primarily in chemical-intensive corn production. Upon introduction, Rep. Ellison pointed out that a U.S. Geological Survey finds atrazine in approximately 75% of stream water and 40% of groundwater sampled near agricultural areas. This potent toxicant is widely applied in the Midwestern states and has been found in drinking water supplies in the Midwest at high levels. Researchers at the Centers for Disease Control and Prevention (CDC) have found that previous population-based exposure studies on atrazine yield significant and systematic underestimates. In fact, atrazine is harmful to humans, mammals, and amphibians even when the amount used is less than the government allows. The U.S. Fish and Wildlife Service acknowledges that the chemical may harm the reproductive and endocrine systems in fish species.

A 2010 study published in the *Proceedings of the National Academy of Sciences* finds that male frogs exposed to atrazine can become so completely female that they can mate and lay viable eggs. Atrazine is specifically associated with infertility, low birth weight, and abnormal infant development in humans. "No one should ever have to worry if the water they drink is making them sick or affecting fertility," said Rep. Ellison. "Germany and Italy banned atrazine use in 1991 and Euro zone health officials banned its use in 2003. Yet, almost 10 years later the United States is still using it. We need to remove toxins like atrazine from our waterways," he continued. This bill complements calls by Beyond Pesticides and other advocacy groups to ban this hazardous chemical.

Toxic Chemical Regulations Anticipated by EPA

In June, a senior U.S. Environmental Protection Agency (EPA) official stated that the agency is prepared to exercise its long-neglected authority under Section 6 of the *Toxic Substances Control Act* (TSCA) to ban or restrict hazardous chemicals. In reference to TSCA, EPA Acting Assistant Administrator for Chemical Safety and Pollution Prevention Jim Jones said, “We will try and exercise some muscle we have not exercised for decades.” EPA has not sought to use this authority since 1991, when the U.S. Court of Appeals for the Fifth Circuit overturned the agency’s attempt to ban asbestos. Speaking to a forum convened by The Environmental Council of the States, Mr. Jones noted that he is expecting a decision from EPA on the matter “in the near future.” Section 6 of TSCA requires that EPA prove it has substantial evidence that a chemical poses an unreasonable risk before it can ban, restrict, or take other actions to manage that risk.

In his comments, Mr. Jones cited EPA’s March 1 announcement that it had selected 83 chemicals or groups of chemicals for risk assessment in the near future. EPA’s work plan identified seven of these chemicals for risk assessment in 2012 with another 18 scheduled for 2013 and 2014. Chemicals scheduled for review in 2012 include methylene chloride, which is found in some household cleaners, and the carcinogen trichloroethylene, which had its last epidemiological review in 1989. “If the chemical is safe, our work will be done,” Mr. Jones said. Otherwise, the use of Section 6 will be explored. “We will find out if it is as hard to use as is said,” Mr. Jones added. Implementing TSCA could impact toxic chemicals such as the so-called “inert” or other ingredients in pesticide products and extractants and other chemical agents in making pesticides and food processing.

National Stroller Brigade Descends on Capitol for Safer Chemicals

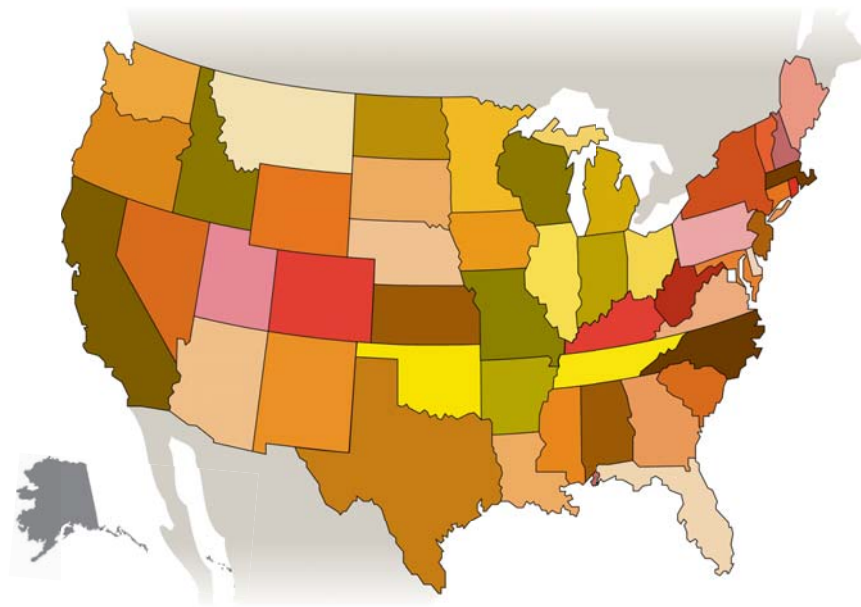
In May, several hundred parents joined nurses and cancer survivors at the U.S. Capitol to demand action on toxic chemicals. The group, named the “National Stroller Brigade,” rallied in support of U.S. Senator Frank Lautenberg’s (D-NJ) *Safe Chemicals Act*, a bill to overhaul antiquated laws governing toxic chemicals. Hundreds of moms, many with children in tow, flew or bused into Washington to deliver 130,000 petition signatures to their respective Senators. “It’s shocking that toxic chemicals end up in everyday consumer products, and in our bodies, without anyone proving that they are safe. The stroller brigade is carrying an important message to Congress that we’re not going to stand by and let our kids continue to be exposed to chemicals that make them sick. Concerned moms are the best weapons we have in this fight. With their help, I will keep advancing the *Safe Chemicals Act* to reform our broken toxic chemical laws and provide a healthier future for our families,” said Senator Lautenberg. The *Safe Chemicals Act* would, in theory, require chemical companies to prove their products are ‘safe’ for human health and the environment when allowed to be used

in commerce.

However, many analysts are concerned about the bill’s continued reliance on risk assessment, which allows unnecessary toxic chemical use and undermines a precautionary approach. Beyond Pesticides has long called for an ‘alternatives assessment’ in environmental rulemaking that creates a regulatory trigger to adopt alternatives. With the ‘alternatives assessment’ approach, exposures considered acceptable under risk assessment calcu-

lations would be deemed unnecessary when safer alternatives are available. Increasing rates of chronic diseases linked to toxic chemical exposure, including cancer, asthma, and infertility, are creating a sense of urgency in state capitals to enact policies to remove these harmful substances from the market. The *Safe Chemicals Act* is currently awaiting a vote in the Senate Environment and Public Works Committee. Participants in the Stroller Brigade marched to increase public pressure on the pending vote.





Ohio County Bans Toxic Pesticide Use on County Property

In April, Ohio's Cuyahoga County Council voted to limit the use of chemical insecticides, weed killers, and other pesticides on county property. According to the *Cleveland Plain Dealer*, the restrictions will apply to the county's 66 buildings, its lawns, and the wide swaths of open space at Whiskey Island and the Cuyahoga County Airport. In describing the ordinance, Councilman Julian Rogers said, "[County pest managers] have to focus on using techniques that will specifically target the pests they're looking to eliminate and will have the least amount of impact to other organisms, including humans." Cuyahoga County is Ohio's most populous county.

"This is a watershed ordinance, certainly for the state of Ohio," said Barry Zucker, executive director of Beyond Pesticides Ohio and long-time advocate for this type of county-wide ordinance. "This is a terrific achievement and a tremendous model for other communities in Ohio and the rest of the nation," he continued. In 2010, Beyond Pesticides Ohio joined with Beyond Pesticides and the Case Western University School of Medicine's Swetland Center for Environmental Health to host *Greening the Community*, the 28th National Pesticide Forum, which focused on green communities and economies. While the seeds for the ordinance were originally planted at the *Greening the Community* Forum, Mr. Zucker explains that the momentum escalated a year later when Beyond Pesticides' board member and national organic turf expert Chip Osborne returned to Cleveland as a keynote speaker at an April 2011 conference organized by Beyond Pesticides Ohio and the Cleveland Botanical Garden. After attending Mr. Osborne's talk, *Fabulous Lawns and Landscapes: Transitioning to cost effective, organic landscape management*, County Council members Sunny Simon and Julian Rogers approached Beyond Pesticides Ohio about the ordinance. Mr. Zucker, his group and allies worked with the Council over the past year leading up to its April, 2012 passage.

Vermont Passes First State Ban on Fracking

On May 4, the Vermont House of Representatives voted 103-36 to give final passage to legislation that will make Vermont the first state in the nation to ban the practice of hydraulic fracturing or "fracking" for natural gas.

Fracking is a method of extracting natural gas from deep in the ground by injecting a mixture of water, sand, and toxic chemicals—including biocides—under high pressure into dense rock formations in order to crack the rock, release the gas, and kill microbes that impede the gas flow. While basic fracking technology has been in use for decades, only recently has the industry developed the ability to drill horizontally within rock formations for thousands of additional feet. This new method requires massive amounts of water and toxic chemicals in order to extract the gas. Enormous holding ponds or tanks are also needed to store the chemically contaminated waste water that comes back up the hole after wells have been fractured. Natural gas is a feedstock in the production of synthetic fertilizers used in chemical-intensive land management.

"Fracking has caused enormous problems with underground water contamination and above ground waste disposal—entire streams have been destroyed," said noted author and environmentalist Bill McKibben.

According to a 2011 minority staff report by the U.S. House of Representatives Committee on Energy and Commerce, more than 650 commonly used fracking products contain chemicals that are "known or possible human carcinogens, regulated under the *Safe Drinking Water Act*, or listed as hazardous air pollutants."

Paul Burns, executive director of the Vermont Public Interest Research Group, which pressed the Vermont legislature to act, proudly declared, "[S]ometimes all it takes is one state to have the courage to lead in order to change the direction of the country. And if you look at how hard the industry fought this, you begin to see that they believe that's true too."

GE Labeling on Ballot in California

In June, California approved a ballot initiative, Proposition 37, which, if passed by voters in November, will require the labeling of genetically engineered (GE) foods on store shelves. The California Right-to-Know campaign gathered 971,126 petition signatures, nearly double the 555,236 signatures required to qualify for inclusion on the ballot. If approved, Californians would join citizens from over 40 countries, including all of Europe, Japan, and China, who have the right to know whether they are buying GE food.

The U.S. Department of Agriculture's approval of GE crops contradicts scientific findings refuting their value. A June Union



of Concerned Scientists (UCS) report concludes that Monsanto's new drought tolerant corn, DroughtGard, does nothing to reduce the crop's water requirements, and only reduces crop losses modestly during moderate droughts.

The UCS report indicates that traditional breeding and improved farming practices do more to increase drought tolerance. Additionally, in April researchers at Portland State University found that GE corn modified to express the insecticidal soil bacterium *Bacillus thuringiensis* (Bt) negatively impacts beneficial soil life. Their results reveal a decreased presence of beneficial mycorrhizal fungi, which are important for nutrient and water uptake, in the roots of Bt corn when compared to non-Bt corn.

If you can't make your voice heard on the California ballot initiative, the best way to

Producers Giving Funds Against Labeling:

Coca Cola North America (Honest Tea, Odwalla) Conagra (French Meadow Bakery, Alexia, Lightlife) Kellogg (Morningstar, Kashi, Bear Naked) General Mills (Cascadian Farm, Muir Glen) J.M Smucker (Santa Cruz Organic), Dean Foods (Horizon Milk), Hormel Foods, Campbell Soup Company, Pepsico, The Sunny Delight Beverage Company, Morton Salt, Cargill, Bimbo Bakeries, Dole Packaged Foods Company, Del Monte, Mars Inc. (Seeds of Change), Godiva Chocolatier, Inc, Hershey Company, Nestle, Wm. Wrigley Jr. Company, Land O' Lakes, Ocean Spray Cranberries Inc., McCormick & Company, Inc, Inventure Foods Inc., Sara Lee Corporation, Knouse Foods Cooperative, Bumble Bee Foods LLC., Pinnacle Foods Group

Organic Producers Giving Funds For Labeling:

Nature's Path Organic, Dr. Bronner's Magic Soap, Organic Valley, Amy's Kitchen, Nutivia, Eden Foods, Straus Organic, Lundberg Family Farms, Edward and Sons

avoid GE foods in the marketplace is to purchase foods that are certified under the USDA organic program, which explicitly forbids GE seeds under its label.

Report Finds Organic Food Is Better for U.S. Jobs

Add "Creates American Jobs" to your list of reasons to buy organic. According to the Organic Trade Association (OTA), producing U.S. foods organically creates thousands more jobs than if that food were produced using chemical-intensive agricultural methods. The OTA report, *2010 Impacts of the U.S. Organic Foods Industry on the U.S. Economy*, shows the organic food industry generated more than 500,000 American jobs in 2010, and builds on data revealing the overall U.S. organic market in 2011 surpassed \$31 billion. The report shows that for every \$1 billion in retail sales of organic products, 21,000 more jobs were created throughout the economy. In addition, the use of organically produced ingredients resulted in the creation of 21% more jobs than would have been generated if the food industry had relied solely on conventional farms for its ingredients. The study compares labor and input use on a wide range of conventional and organic farms, and attributes the job-creation differences largely to greater labor intensity on organic farms, smaller farm size, the need for an organic certification industry, and reliance on smaller retail outlets.

"This report sends a strong message that doing what's good for the environment and what's good for industry economics are not mutually exclusive," said U.S. Representative Sam Farr (D-CA). "The organic food processing industry is creating jobs, stimulating our economy, and delivering the products that consumers increasingly demand. This report is only the latest testament on why supporting organic is a no-brainer."

Organic food contributes to better health through reduced pesticide exposure, environmental contamination, and worker poisoning. Beyond Pesticides continues to advocate through its *Eating with a Conscience* website for consumers to choose organic because of the environmental and health benefits to consumers, workers, and rural families.

Potomac River “Most Endangered,” Clean Water Protections Needed

With 16 attempts by Congress to dismantle the *Clean Water Act*, and rivers nationwide facing threats from natural gas “fracking,” chemical pollution, and new dams, in May American Rivers released its annual list of America’s Most Endangered Rivers.[®] It names the Potomac River, known as “the nation’s river,” as it flows through the capital, the most endangered in the country. While the Potomac is cleaner than it used to be, the river is still threatened by urban and agricultural pollution—and it could get much worse if Congress rolls back critical clean water safeguards.

As the country commemorates the 40th anniversary of the *Clean Water Act* this year, the Potomac is emblematic of what is at stake for rivers nationwide. The report notes that urban development is funneling tons of polluted rainwater to the river, and chemical fertilizers from lawns and farms are making matters worse. Additionally, wastewaters overflowing from sewers, along with pharmaceuticals flushed down

toilets, and pesticide run-off, are contributing to dead zones in which marine life dies and might cause intersex fish.

“If Congress slashes clean water protections, more Americans will get sick and communities and businesses will suffer,” said Bob Irvin, President of American Rivers.

Before the *Clean Water Act* was enacted in 1972, the Potomac and other notable rivers in the U.S. were cesspools of sewage and industrial pollution. The *Clean Water Act* affords the Potomac and other rivers across the country protections from indiscriminate pollution so that waterways are cleaner and safer for drinking, boating, and fishing. However, according to the U.S. Geological Survey, over 50% of waterways in the U.S. are contaminated

with pesticides and other pollutants that exceed federal standards.

Beyond Pesticides encourages you to contact your members of Congress and tell them to strengthen the *Clean Water Act*—not dismantle it. Meanwhile, efforts in Congress are ongoing to attach to the Farm bill the controversial H.R. 872, *Reducing Regulatory Burdens Act*, which seeks to undermine federal authority to monitor our nation’s waterways for pesticide contamination.

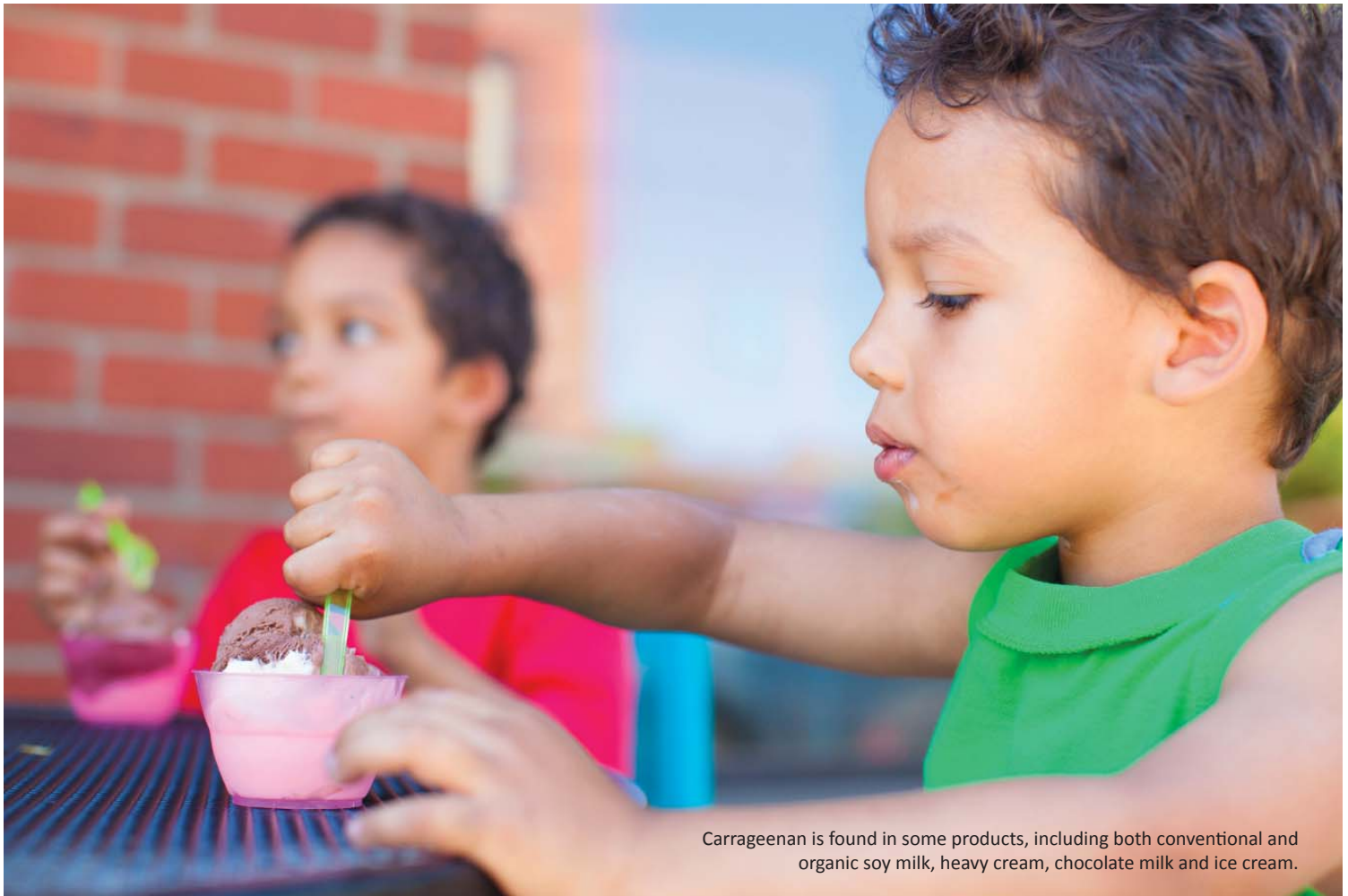


Public Input Sought on Petition to Ban Pesticide Deadly to Bees, Senators Urge Expedited Action

The U.S. Environmental Protection Agency (EPA) has opened a 60-day public comment period on the agency’s decision to deny a request by beekeepers to immediately suspend the use of clothianidin. The legal petition was filed earlier this year by 25 beekeepers and environmental organizations, and cites significant acute and chronic bee kills across the United States linked to neonicotinoid pesticides, particularly clothianidin. Senator Kirsten Gillibrand (D-NY), a member of the Senate Agriculture Committee, is calling for an expedited review of pesticides that could be inadvertently decimating honey bee populations. The letter is also signed by Senators Patrick Leahy (D-VT) and Sheldon Whitehouse (D-RI). EPA is not expected to complete its review until 2018, and any implementation plans could take years beyond that to complete. Given that Colony Collapse Disorder (CCD) has decreased the U.S. bee population by 30 percent annually since 2006, Senator Gillibrand is urging a quicker timeframe, asking that it be completed by the end of next year.

Since 2006, beekeepers in North America and Europe have lost about one-third of their managed bee colonies each year due to CCD. While there is not agreement on the cause, the neonicotinoid class of pesticides is receiving particular attention from beekeepers and researchers. Biologists at the University of California at San Diego (UCSD) recently discovered that a small dose of the commonly used neonicotinoid crop pesticide imidacloprid turns honey bees into “picky eaters” and affects their ability to recruit their nestmates to otherwise good sources of food. Additionally, two new studies in the journal *Science* add to a growing body of research that shows pesticides cause significant problems for the health of individual honey bees as well as the overall health of honey bee colonies, including disruptions in mobility, navigation, feeding behavior, foraging activity, memory and learning, and overall hive activity.

TAKE ACTION: Tell EPA to suspend clothianidin. Submit your comments by September 25, 2012, identified by Docket ID number EPA-HQ-OPP-2012-0334-0015 at www.regulations.gov. Follow the online instructions for submitting comments.



Carrageenan is found in some products, including both conventional and organic soy milk, heavy cream, chocolate milk and ice cream.

Controversy Over Processed Organics

A non-organic ingredient taken out of infant formula, but remains on market

By Terry Shistar, Ph.D.

In Albuquerque in May, the National Organic Standards Board (NOSB) voted to allow the continued use of carrageenan with its cancer causing contaminant in organic food, while taking it out of infant formula. The vote came following conflicting testimony and considerable debate. The debate on carrageenan has become part of the larger question of whether processed food approved by certifiers and labeled with the USDA organic seal should be able to include non-organic ingredients that are not essential to its production and bring with it substantial safety and environmental issues and uncertainties.

The NOSB must apply criteria in the *Organic Foods Production Act* (OFPA) in deciding whether a synthetic or non-organic nonsynthetic material may be added to organic food. The criteria require that such a substance is not harmful to human health and the environment, taking into account its manufacture, use, and disposal; that it be essential to organic production; and that it be compatible with a system of sustainable and organic production.

Forms of Carrageenan and Contamination

Carrageenan was originally approved for use as a stabilizer and thickener in organic products in 1995, and has been reapproved each time it has come up for sunset review on a five year cycle. In the past, the NOSB has known from a technical review performed for the board that low molecular weight carrageenan, also known as “degraded carrageenan” or “poligeenan,” may cause cancer, inflammation, and ulceration of the colon. The International Agency for Research on Cancer (IARC), created by the World Health Organization of the United Nations, classified poligeenan as Group 2B, “Possibly carcinogenic to humans,” in 1993. This finding means that the agency found adequate evidence that poligeenan causes cancer in animals, but did not have studies on humans (typical in cancer classification since testing on humans is outlawed) to justify a higher classification. The findings on lower molecular weight carrageenan with poligeenan were considered irrelevant to the higher molecular weight food use carrageenan until data was brought to the board that shows the presence of poligeenan there as well.

The Undisputed Science

The following scientific findings are unchallenged:

- Low molecular weight carrageenan, also known as poligeenan, causes inflammation and ulceration of the digestive system.
- Poligeenan is classified by the International Agency for Research on Cancer as a “possible human carcinogen” (Group 2B).
- Food-grade carrageenan contains poligeenan in concentrations varying from sample to sample, but at levels that cannot be reliably limited or measured.
- No known quantity of a carcinogen can be assumed to be without carcinogenic effect.

The conclusion from this undisputed science is that we must treat food-grade carrageenan as a carcinogen.

Elements of the Debate

Two elements to the debate at the meeting in Albuquerque were the (i) “need” (or “essentiality,” as required in the *Organic Foods Production Act (OFPA)*) for carrageenan as a stabilizer and thickener in organic products, and (ii) science concerning the health effects. The NOSB heard comments from several producers that used carrageenan in some of their products, most of whom wanted to ensure that it would still be available for them to use. On the other hand, some of those food processors said that they had already minimized or planned to eliminate the use of carrageenan in their organic products.

The Science

The scientific part of the debate centers on the relevance of the science concerning poligeenan to the health effects of carrageenan. This article focuses on scientific results that are well-accepted and non-controversial. No one challenged the conclusion that poligeenan causes inflammation and ulceration of the digestive system. It has, in fact, been widely used to induce inflammation in immune system experiments. Nor did anyone challenge IARC’s classification of poligeenan as a “possible human carcinogen.” The new (since last approved by the NOSB) Technical Evaluation Report (TR) performed for the NOSB refers to studies showing that consuming food grade carrageenan may, through contamination with poligeenan or metabolism of carrageenan to lower molecular weight forms, result in the same health effects as consuming poligeenan.

How Carrageenan Is Made

Carrageenan is derived from various species of red seaweeds. The term “carrageenan” actually refers to

a family of linear polysaccharides, made up of disaccharide units. There are several carrageenans with different molecular structures. The most common in food applications are known as iota, kappa, and lambda carrageenans, differing in “degree of sulfation, extent of branching, solubility, cation binding, and ability to form gels under different conditions.” Different seaweeds contain different combinations of iota, kappa, and lambda carrageenans, which are extracted using several different chemical extraction methods resulting in chemical changes to the carrageenan molecules. In addition to the variation in forms among the types of carrageenan, any given form may exist in a variety of molecular weights, depending on the number of disaccharide units in particular polysaccharide molecules. Therefore, the molecular weight is expressed as an average, which may differ from sample to sample. The molecular weight is important for two reasons: (i) very low molecular weight carrageenan (below 10,000 daltons) is absorbed through the intestinal wall, and (ii) the experimental evidence linking carrageenan to adverse health impacts mostly involves experiments with “poligeenan” (variously defined as carrageenan with molecular weight 10,000-20,000, 20,000-40,000, up to 80,000 daltons). Yet another related issue is the fact that infants absorb larger molecules of carrageenan through their intestines.

Since molecular weight is such a crucial issue, it is not surprising that the discussion at the NOSB meeting focused on the relevance of the data on poligeenan to the decision on carrageenan. The Handling Subcommittee of the NOSB, which voted unanimously with one absent to relist carrageenan without restrictions, supported the position that carrageenan is not poligeenan, and therefore the evidence concerning cancer and other health effects caused by poligeenan was, in the subcommittee members’ judgment, irrelevant to the decision.



Check your labels closely to make sure carrageenan isn’t included in the product’s ingredient list. It may be found in both processed organic and conventional foods.
Photo courtesy www.migrainemindset.blogspot.com

Joanne Tobacman, M.D., a physician and scientist at the University of Illinois College of Medicine who has been studying the effects of carrageenan for almost 20 years, was cited in the TR and appeared in person to testify. She has published 18 peer-reviewed papers addressing the biological effects of carrageenan, mostly funded by the National Institutes of Health and the Veterans' Administration. Among her publications is a 2001 review in *Environmental Health Perspectives* of the harmful effects of carrageenan on the gastrointestinal system, which presented evidence that low molecular weight carrageenan may be present in food grade carrageenan and may be produced in the digestion of carrageenan in food. *Environmental Health Perspectives* is a publication of the National Institute of Environmental Health Sciences, whose publications OFPA requires the NOSB to review in making decisions concerning listing materials on the National List.



The presence of poligeenan in carrageenan is supported by published data on the distribution of molecular weights in carrageenan. These studies show that food-grade carrageenan contains varying amounts of poligeenan, in the neighborhood of 5%. Despite the published estimates of the distribution of molecular weights in carrageenan, the industry has been unable to devise a practical method of meeting and verifying a 5% limitation on poligeenan. Recently, the carrageenan industry trade group, Marinalg International, reported:

In 2004 the European Commission published new specifications for carrageenan and PES [processed Eucheuma seaweed] requiring that carrageenan and PES for use in food must not contain more than 5% molar mass with molecular weight less than 50,000 Da.... After eight years of planning, experimentation, and analysis (2003 to 2011), Marinalg has been unable to reliably measure this new specification in the laboratories of its members, its customers, or in independent laboratories.

The fact that any poligeenan is in food-grade carrageenan is significant because of the adverse health effects associated with poligeenan, particularly cancer. Since no known quantity of a carcinogen can be assumed to be without carcinogenic effect, any quantity of poligeenan—and thus any quantity of carrageenan—must be taken to be harmful by regulators and consumers.

Environmental Impacts

While the health effects of consuming carrageenan are most nota-

ble, there are also ecological impacts that OFPA requires the NOSB to consider. Overharvesting of a cold water species of seaweeds used to make carrageenan has resulted in a population crash of the wild species. Warm water species are cultivated and present “serious bio-invasive risks for nearby marine communities” —not only spreading beyond cultivation sites, but also smothering coral ecosystems and contributing to reef degradation. Other adverse impacts are detailed in the TR (lines 469-551). Furthermore, “The industrial manufacture of carrageenan is a process that produces large amounts of alkaline waste water which may pose environmental problems.”

Take Action

Because the process of review by the NOSB is a transparent process with full disclosure, providing public access to the underlying science and the meeting notes of subcommittee deliberations (see NOSB webpage on the Agricultural Marketing Service, USDA website), organic consumers are able to make informed decisions in the marketplace and influence NOSB decisions. With this information, consumers can choose to seek out or avoid ingredients. In this case, the Cornucopia Institute has created a shopping guide to help consumers avoid this ingredient, which is available at www.cornucopia.org/shopping-guide-to-avoiding-organic-foods-with-carrageenan (see chart on the next page).

In this context, organic can increasingly become a food sector in which producers, handlers, and consumers are able to avoid uncertainty and, when industry and academic scientists differ, embrace precaution and the precautionary principle.

A fully cited version of this article is available online at www.beyondpesticides.org/infoservices/pesticidesandyou.

Guide to Organic Products Containing Carrageenan

The following is a list of products with and without carrageenan. (Source: *Cornucopia Institute*)

	Contains Carrageenan	Does Not Contain Carrageenan
Dairy Products	Chocolate Milk	
	Clover Stornetta, Horizon, Kalona Supernatural (Kalona has committed to removing carrageenan, and will be carrageenan-free by the end of 2012. Check ingredients list), Natural By Nature, Organic Valley, Publix, Simply Smart	Castle Rock Organic Farms, Crystal Ball Farms, Strafford Organic Creamery, Tricking Springs Farms
	Ice Cream	
	Julie's (mint fudge, mocha fudge and peanut butter fudge flavors only)	Alden's, Ben and Jerry's Organic, Castle Rock Organic Farms, Crystal Ball Farms, Green and Black's Organic, Julie's (all flavors except mint fudge, mocha java and peanut butter fudge), Publix, Stonyfield, Strafford Organic Creamery, Strauss Family Creamery, Three Twins
	Yogurt	
	Stonyfield (Oikos – caramel flavor only, Squeezers – all flavors), Horizon (Tuberz™)	Butterworks, Cedar Summit (pourable), Crystal Balls Farm, Hails Family Farm, Hawthorne Valley Farm, Horizon (all except Tuberz™), Kalona Supernatural, Nancy's, Organic Valley (pourable), Redwood Hill Farms, Seven Stars, Stonyfield (all except caramel Oikos and Squeezers), Straus Family Creamery, Wallaby Organic
Sour Cream		
Horizon (lowfat), Natural By Nature, Publix	365 Whole Foods, Clover Stornetta, Friendship Brand, Horizon (regular only), Kalona Supernatural, Organic Valley (regular and lowfat), Nancy's, Strauss Family Creamery, Wallaby Organic	
Non-Dairy Alternatives	Almond Milk	
	Almond Breeze (Blue Diamond), Pacific Foods, So Delicious, Trader Joe's (aseptic)	365 Whole Foods, Almond Dream, Natura (8 flavors), OMilk NYC, Silk PureAlmond (including chocolate-flavored), Westsoy, Trader Joe's (refrigerated)
	Soy Milk	
365 Whole Foods, 8th Continent, Earth Balance, Great Value (Walmart), Nature's Promise, O Organics – Safeway (refrigerated original and vanilla), Organic Valley, Pearl Soymilk (Kikkoman), Pacific Foods, Publix, Silk, Soy Dream, Soy Slender, Sunrich, Trader Joe's, Vermont Soy, Vitasoy, Wegman's, Westsoy (Organic Plus, Nonfat), Wildwood, ZenSoy	Eden Soy (Eden Foods has committed to removing carrageenan from all its products. Currently, most soymilk is already carrageenan-free, but EdenBlend and chocolate flavored soymilk still contains carrageenan. Check ingredients list), Westsoy (original, unsweetened, lowfat)	
Other	Deli Meat	
	Applegate (Packaged and Sliced: Roasted Chicken, Turkey Breast, Roasted Turkey Breast, Smoked Chicken, Smoked Turkey Breast)	Applegate (Roast Beef, Genoa Salami, Uncured Ham)
	Orange Juice	
	Knudsen's (Yumberry), Lakewood (Acai Amazon Berry and Coconut)	Apple and Eve, Columbia Gorge, Honest Kids, Knudsen's (all flavors except Yumberry), Lakewood (all flavors except Acai Amazon Berry and Coconut), Organic Valley, Publix, Santa Cruz, Uncle Matt's
Organic Pizza		
Annie's Organic Frozen Pizza	365 Whole Foods, Amy's (70% organic), Publix, Rising Moon Organics (70% organic), Trader Joe's	



Whole Organic Food vs. Synthetic Nutritionism

By Terry Shistar, Ph.D.

In *Defense of Food* by Michael Pollan is not a new book, but it is particularly relevant at a time when Beyond Pesticides is evaluating petitions to the National Organic Standards Board (NOSB) for additions of synthetic nutrients to organic infant formula. The book is also an instructive reminder of foundational issues touched on by an article in *The New York Times*, “Has ‘Organic’ Been Oversized?” (July 8, 2012), which challenges the influence of large corporations over the key ingredients and practices allowed under the organic label. Mr. Pollan establishes a framework that helps us to understand the potential pitfalls involved in the evaluation of nutrients for organic infant formula. Importantly, the book identifies a critical failure, present in the *Times* piece, to put several controversial NOSB decisions in the context of a massive shift away from pesticides in organic systems and the resulting health and environmental protections.

Nutritionism vs. a Whole Food

Mr. Pollan seeks to defend food from the ideology, which he, following others, terms “nutritionism.” Nutritionism defines food in terms of the (identified) nutrients it contains. He traces the origins of nutritionism back to the development of the “lipid hypothesis” for explaining the alarming post-World War II increase in chronic diseases, including heart disease, cancer, obesity, and diabetes. The lipid hypothesis, which blamed the increase in those diseases on particular components of food —saturated fat and cholesterol— marked a paradigm shift in nutrition, which was reflected in revisions to *Dietary Goals for the United States* by the Senate Se-

lect Committee on Nutrition and Human Needs. The original version had recommended a reduction in consumption of red meat and dairy products, but was revised (largely due to criticism from the beef and dairy industries) to “reduce saturated fat intake.”

“Henceforth,” says Mr. Pollan, “government dietary guidelines would shun plain talk about whole foods, each of which has its trade association on Capitol Hill, but would instead arrive dressed in scientific euphemism and speaking of nutrients, entities that few Americans (including, as we would find out, American nutrition scientists) really understood but that, with the notable exception of sucrose, lack powerful lobbies in Washington.”

This led to a paradigm that judges a food solely on the basis of the nutrients it contains. “Food” would now be defined as the sum of its nutrients. The nutritionist paradigm appears to be more scientific. The amount of protein or saturated fat or vitamin C in a food can be quantified. Experiments conducted with foods containing verified quantities of nutrients are more reproducible than those containing foods identified as “broccoli” or “chicken” or “wheat.” But this paradigm cannot address qualitative differences, such as the difference between broccoli produced organically or with chemical-intensive methods.

Infant formula provides a particularly clear example of the successes and failures of nutritionism. On one hand, as Mr. Pollan says, “The entire history of baby formula has been the history of one overlooked nutrient after another. . .[S]till to this day babies fed on the most “nutritionally complete” formula fail to do as

well as babies fed human milk.” On the other hand, the acceptance of the whole concept of infant formula—the idea that a chemical mixture in a base of cow milk or soy protein extract could be a reasonable substitute for breastfeeding—is a triumph for nutritionism.

Organic Infant Formula

And how about “organic infant formula”? Every authority giving advice on infant nutrition agrees that “Breast is best.” Certainly, any infant who cannot be breastfed should receive the best available substitute, and it should be made with organic ingredients whenever possible. But should such chemical formulas get the organic seal? As I write this, there are petitions to the NOSB to allow eight more synthetic nutrients into organic infant formula: beta carotene, lutein, lycopene, ascorbyl palmitate, L-methionine (in soy-based formula), L-carnitine, taurine, and nucleotides. There are varying degrees of support for the importance of these nutrients to infants, but we still must ask, “Is infant formula a food? Or is it merely a chemical substitute for food?”

The New York Times article on organic food reveals the domination of the organic processed food industry by large corporations, most of which sell much more that is nonorganic than organic, and the degree to which those corporations influence the decisions of the NOSB. The article points out the growth in the number of synthetic materials permitted in organic foods. This, too, can be attributed to the impact of the nutritionist paradigm. Mr. Pollan says, “Nutritionism might be the best thing ever to happen to the food industry, which historically has labored under the limits to growth imposed by a population of eaters that isn’t expanding nearly as fast as the food makers need it to if they are to satisfy the expectations of Wall Street... Not only does nutritionism favor ever more novel kinds of highly processed foods (which are by far the most profitable kind to make), it actually enlists the medical establishment and the government in the promotion of those products.”

Nutritionism and Synthetics

Nutritionism has contributed to the expansion of synthetic and other nonorganic ingredients in two ways. The first is through what we’ve seen with infant formula—the claim that foods are “better” when they have artificial nutrients added. The second is less direct. Since foods are, according to nutritionism, simply carriers for nutrients, it doesn’t matter how modified they are. Reduce the fat in milk, remove the bran and germ from wheat, replace animal fats with vegetable oils, add refined sugars, and so forth



—it is expected that the organic food processor should be able to create all the different kinds of “foods” that the nonorganic food processor makes. If that creation has the wrong properties—taste, color, texture, or “mouthfeel,” then the organic food processor expects the necessary additives will be approved. Thus, the NOSB has found such additives as carrageenan to be “necessary” in organic food.

Despite the increased number of synthetics permitted in organic food, the organic label is not “pure marketing,” as the *Times* article suggests. Temporarily falling into the nutritionist trap himself, Mr. Pollan refers to research showing that organically produced food contains more nutrients—including minerals and healthful phytochemicals—than that produced by chemical-intensive systems: “Halweil cites a considerable body of research demonstrating that plants grown with industrial fertilizers are often nutritionally inferior to the same varieties grown in organic soils.”

But there is another way that that the *Times* article—and nutritionism—divert us from the chief value of organic food. As Mr. Pollan says, “I no longer think it’s possible to separate our bodily health from the health of the environment from which we eat or the environment in which we eat or, for that matter, from the health of our general outlook about food (and health).” According to Jay Feldman, executive director of Beyond Pesticides and NOSB member, “The best way to protect our planet and all its inhabitants is through the exponential and rapid growth of the organic sector, and a rejection of mainstream chemical-intensive agriculture with a billion pounds of toxic chemicals used annually, threatening honey bees and pollinators, children’s and community health, clean air and water, and biodiversity, and dependent on petroleum-based products that contribute to global climate change.”

Back to the Future

Communities are doused with pesticides in response to West Nile Virus outbreak

Jay Feldman and Nichelle Harriott

The raining down of pesticides has taken communities across the U.S. by storm. While these programs no longer use DDT, this type of blanket spraying with hazardous pesticides and its associated adverse effects on the public's health and the environment were decried 50 years ago this year in the publication of *Silent Spring* by Rachel Carson. And, so, we return to pest control approaches that have a proven track record of failure from an efficacy, public health, and environmental protection perspective. As of August, the Centers for Disease Control and Prevention (CDC) recorded 87 deaths and 1,993 cases of illness from West Nile virus (WNV) and urged communities to bring out the sprays. Dozens of communities across the U.S. have now doused their communities, while proclaiming the safety of their methods. However, the spray tactics, with ground and air assaults, has been called into question by health advocates and researchers who have studied the most effective and protective means of preventing the transmission of the virus.

The public health concern is that widespread spraying for adult mosquitoes (adulticiding) is not the most effective control method, and it introduces additional short- and long-term public health hazards on top of those posed by West Nile virus. Many experts believe that those people most vulnerable to the effects of West Nile virus and those with elevated risk factors for pesticide poisoning are one in the same. Because the pesticides that are being used in these spray programs, typically synthetic pyrethroids with a synergist like piperonyl butoxide (PBO), are nervous system and respiratory poisons associated with endocrine disrupting effects and, in some cases cancer, people with asthma, nervous and immune system illness, and other pre-existing conditions are at highest risk from exposure. Highly neurotoxic organophosphate pesticides are being used in some communities, despite having been taken off the market for most residential uses.

Despite the science on pesticides and the misleading information that officials often distribute in their communities, and the lack of spray program efficacy, the City of Dallas (Texas) posted on its website the following: "Aerial spraying is a very effective and safe way to kill adult mosquitoes in large, densely populated areas." After discounting health effects, the announcement goes on to indicate "for people concerned about exposure during aerial spraying" a number of precautionary steps that can be taken. These steps include ways to minimize exposure, but imply that there is no reason to be concerned or take precautionary action.

It is understandable that local, state, and federal officials want to act decisively, but that does not mean that the widespread use of hazardous pesticides is the best course of action. Communities that are most successful and smart about mosquito control engage in aggressive efforts to reduce and eliminate mosquito breeding areas in standing water around homes and buildings and throughout the community. Mosquito breeding can take place in stagnant water, from very small to larger pools—bottle caps, discarded automobile tires, planters, containers, rain gutters, drains, or under piles of leaves.

According to experts, the threat of WNV is best managed through an integrated program that does not expose vulnerable populations to pesticides, including children, pregnant women, the elderly and people with compromised immune or nervous systems. The most effective program to protect the public from WNV focuses on removing breeding areas, stopping mosquitoes at the larval stage, and mass public education on prevention and precaution. These preventive programs should be in place as standard practices at the community level, whether managing nuisance mosquitoes or those carrying and insect-borne disease. However, many communities instead have often neglected this public health re-

Avoid the Bite Least-Toxic Mosquito Repellents are Available and Safer to Use

Oil of Lemon Eucalyptus— CDC recommends oil of lemon eucalyptus repellents as a good alternative to DEET, which is highly toxic. This plant-based repellent provides protection similar to low concentration DEET products

Essential Oils— Garlic oil, cedar oil, neem oil and geranium are some least-toxic botanical pesticides that have some repellency action against insects. Others that can also be used are citrus oils, mint oil, pine oil, pepper extracts, and herbal extracts.

Citronella— The same ingredient in the candles that repels mosquitoes is also in some mosquito sprays

Picaridin— Derived from pepper, this is a repellent that CDC says provides comparable protection as DEET products with similar concentrations.

Products with these ingredients can be found in most health food stores and many retail outlets

sponsibility and then try to respond to crisis outbreaks of illness with relatively ineffective adulticiding spray programs.

How to Protect Yourself and Your Community

With the rising concern about West Nile virus this year, important steps can be taken by your community for mosquito management without poisoning people and the environment that sustains us. Convincing community decision makers to adopt the best public health strategy requires a high degree of public involvement that cuts across the community, from residents, medical practitioners, scientists, to elected officials. Decision makers have to understand the range of issues associated with the most effective action and the most protective if the residents' health. To provide the basic background information that supports action, Beyond Pesticides has produced *Public Health Mosquito Management Strategy for Decision Makers and Communities* and a specific webpage to inform an effective course of action, www.beyondpesticides.org/mosquito/index.htm.

Below we summarize the key elements of moving forward with effective and protective programs.

An Effective Community-Based Approach

Starting with a sound, cost-effective community mosquito man-

agement plan and program is critical to protecting people from WNV and pesticides.

Many states have mosquito control districts that are tasked with monitoring and controlling mosquito populations come the summer months. From the months of May through September, it is often common to see trucks and low flying aircraft fogging and spraying in areas prone to mosquitoes. These chemicals, which target adult flying mosquitoes, include pyrethroids like permethrin and resmethrin, and organophosphates like naled and malathion, and synergists like piperonyl butoxide. [See box below]

Why is aerial spraying and fogging of pesticides not effective? The frequency of pesticide applications required for aerial/fogging applications to be effective, combined with the public health risk caused as a result of these applications makes aerial mosquito spraying campaigns among the least effective strategies both in terms of cost and public safety. According to Cornell University entomologist David Pimentel, PhD, it is estimated that less than 0.0001% of the pesticide applied actually reaches the target mosquito. A study from the Harvard School of Public Health found that aerosol plumes fail to contact the target mosquitoes, and concludes that such insecticidal aerosols may not effectively reduce mosquito populations and the potential for disease transmis-

Commonly Used Mosquito Pesticides

Chemical	Type	Neurotoxic	Skin Sensitizer	Environmental Contaminant	Wildlife Effects	Cancer	Endocrine Disruption	Reproductive/Developmental Effects
<i>Bacillus thuringiensis israelensis</i> (Bti)	Bacterial larvicide				X☠			
Permethrin	Synthetic pyrethroid	X☠	X☠	X☠	X☠	X☠	X☠	X☠
Piperonyl Butoxide (PBO)	Synergist	X☠	X☠		X☠	X☠	X☠	X☠
Sumithrin/Phenothrin	Synthetic pyrethroid	X☠					X☠	
Resmethrin	Synthetic pyrethroid				X☠		X☠	X☠
Malathion	Organophosphate	X☠	X☠	X☠	X☠	X☠	X☠	X☠
Naled	Organophosphate	X☠	X☠	X☠	X☠			

Synthetic pyrethroids are neurotoxins, have irritant and/or sensitizing properties, and are linked to endocrine disruption. They are extremely toxic to aquatic organisms, moderately toxic to birds, Piperonyl butoxide (PBO) is one of the most commonly used synergist added to pesticide products to increase the potency. PBO is highly toxic, weakens the immune system, adversely affects reproductive function, causes liver and kidney damage and is a possible human carcinogen. PBO is relatively short-lived in the environment.

Organophosphate pesticides are nerve poisons, affect neurodevelopment, weaken the immune system, impair respiratory function, and are associated with increased risk of leukemia.

sion. This means that the vast majority of the chemical is allowed to enter the air and environment to trigger asthma responses, rashes, headaches, nausea, and neurological effects in the communities where spraying is the norm, in addition to contaminating water supplies and endangering non-target insects such as pollinators, birds and fish.

Acton Steps

A program involving regular monitoring along with the use of least-toxic control methods, education, and the elimination of habitats for larval mosquitoes have sustainable, long-term effects against mosquito populations. What follows can be implemented at the community level to combat mosquito populations.

Clean up

- Ensure continuous flow of water in streams by eliminating border vegetation that produces habitat for mosquito development.
- Drain or fill back-water pools and swamps where stagnant water accumulates.
- Remove overgrown vegetation and debris from along the banks of the lakes and ponds to discourage mosquito breeding. Such bodies of water should have a steep clean shoreline with as little vegetation as possible to prevent vegetation from causing stagnant pools of water.

Monitoring

- State officials and the relevant authorities should monitor mosquito population levels and habitat availability to determine how to proceed before resorting to chemical controls.

Natural Predators

- Use indigenous fish populations to eat mosquito larvae in shallow waters and ornamental pools. Certain freshwater fish, such as mosquitofish, fat-head minnows, killifish, and bluegill can eat their weight in mosquito larvae. These predatory fish are used successfully in the marshes in New York, New Jersey and other parts of the U.S.



Mosquito Mist: No Easy Way to Mosquito Control

Misters have been growing in popularity because they are perceived as a convenient and easy application method to control mosquitoes. Mosquito misters inject a super-fine, semi-continuous mist of pesticide into the air to target mosquitoes. Often these products are expensive to purchase and install, running into the thousands of dollars. However, consumers may be getting more than they bargain for.

Regulation

Firstly, regulations for these systems may vary from state to state. Some states may forbid the use of certain pesticides, or any pesticides at all in these systems in residential areas. Some states may require signs to be posted, while others may not regulate their use at all. Misting system components are considered "application equipment" and therefore are not regulated by EPA. EPA does, however, regulate the pesticide formulations accompanying mister systems. Thus far, the pesticides permethrin, pyrethrins and the synergist piperonyl butoxide, are used in misting systems and have been approved for use in these systems.

Precautions for Using Mist

Misters pose unique dangers to human health due to inhalation and dermal absorption of the fine pesticide mist. This can lead to headaches, rashes and other allergic reactions, nausea, and a host of other acute and chronic symptoms. Beyond Pesticides does not recommend using misters for mosquito control. Other factors to be mindful of:

- Permethrin, pyrethrins, and piperonyl butoxide are toxic and endanger human and environmental health. These chemicals are not recommended for use as part of a long-term mosquito control plan in residential areas. Therefore, misters utilizing these chemicals should be avoided.
- If using a mister, use a least-toxic chemical product (e.g. oil of lemon eucalyptus etc.). Make sure the nozzles are directed to spray toward the target area and away from eating/cooking areas and any water body including swimming pools and fish ponds. Set nozzles to direct mist away from outside air conditioners or other home air intakes that can lead to indoor inhalation of mist.
- Mist will increase the probability of chemical drift, and pesticide residues may end up in homes, schools and other nearby areas. Chemical drift can travel far from the site where the mister is being used. Drift can cause chemical injury to crops, ornamental gardens, waterways and of course people, including children. *Important:* Keep in mind that some neighbors may object to drift of chemicals onto their property and have elevated risk factors.
- Mist should not be used when people, pets, or foods are present. Therefore, automatic timers should be set for times when people and pets are unlikely to be exposed.

- Recently, New Jersey introduced 10,000 tiny copepod crustaceans to eat mosquito larvae in ditches, pools and other areas of stagnant water. Louisiana has also been successful with copepods for larval control.

Least-toxic Larviciding Options

- *Bacillus thuringiensis israelensis* (Bt) is a biological larvicide that prevents mosquitoes from developing into breeding, biting adults. Available as a suspension or as dissolvable blocks or capsules for areas of pooling or stagnant water,

or for use in ornamental pools, Bt is a soil bacterium that is effective against mosquito larvae and numerous other insect pests. Bt lasts approximately 30 days in water.

Mosquito Repellents – Avoid permethrin and DEET

Mosquito repellents work by disorienting mosquitoes so that they are unable to find their blood-meal targets. There are many products with toxic ingredients on the market that once put on the skin or inhaled, can cause long term adverse health effects. Ingredients like permethrin and DEET are commonly formulated in

mosquito repellent aerosols and sprays. Permethrin is classified as “Likely to be Carcinogenic to Humans” and can affect both male and female reproductive systems. Dermal application of DEET and permethrin, alone or in combination, can lead to many physiological, pharmacological, and behavioral abnormalities, particularly motor deficits, and learning and memory dysfunction. Persons wearing permethrin-impregnated clothing have been found to have higher levels of pyrethroid metabolites in their urine due to high rates of dermal absorption of permethrin from the treated clothing. Based on this, it is advisable to avoid permethrin, and DEET-based products.

Beware of Toxic Promises Made by Private Mosquito Control Operators



Advertisement for Mosquito Squad Company in front of a playground

A recent *Washington Post* article featured ‘Mosquito Squad,’ a national franchise of about 100 outlets throughout the U.S. According to the article, customers pay \$400 to \$900 a year, depending on property size, to be sprayed for mosquitoes every three weeks between April and the end of September. The featured ‘Mosquito Squad’ of Washington DC and environs typically has its technicians don gas-powered backpacks and use 110-gallon containers for application. Interestingly, the *Post* article was accompanied by a photo of a Mosquito Squad applicator fitted with a respirator.

‘Mosquito Squad’ omits the term “pesticide” from its advertising, instead opting for the more benign terms “product” or “barrier spray” that “paralyzes and kills insects.” Little to no information is provided about the chemicals being used, or any potential human or environmental health impact. Given that spraying for mosquitoes is not effective, and mosquitoes usually disperse and reenter the treatment area, many consumers are kept on a pesticide treadmill from which there seems to be no escape.

Don’t be fooled...

As typically done by many pest control operators, human health hazards associated with the products they used are downplayed. Oftentimes, the unsuspecting customer is told the product is completely “safe” and approved as “safe” by the EPA. However, do not be fooled! Pesticides should never be considered safe. Many, like permethrin and other synthetic pyrethroids, are misleadingly marketed as derived from natural sources, in this case from the chrysanthemum flower. This unfortunately does not mean the chemical is botanical or safer to use.

As the customer, it is your right to know what is being applied, the possible human and environmental effects, and to be provided with an ingredient list or the Material Safety Data Sheet (MSDS). More importantly, it is your right to refuse to be exposed to toxic substances being advertised as “safe.”

Before you hire a private pest control operator:

- Ask for the least-toxic alternative. If the company does not have one, then find one that does.
- Request product information such as ingredient lists or an MSDS. Some states require product information to be provided to consumers.
- If not provided, research potential human and environmental health effects of the products to be used. Visit Beyond Pesticides’ Pesticide Gateway for pesticides and alternatives, or call for help disseminating information.
- Ask what precautionary measures you should take prior to pesticide application. (e.g., removal of pets and children, close windows, remove or cover food and water supplies, etc.)
- Notify your neighbors of your pesticide application and post notification signs for the treatment area(s).
- Determine whether the reapplication schedule is right for you or even necessary.
- Ensure you minimize pesticide drift from your property. For example, pesticide application should not be done on a windy or rainy day.

Back to School

With another school year upon us, this can be an exciting and busy time of the year for parents and teachers, as children return to school this fall. During this hectic time, it's important to remember that children may face unexpected dangers at school from well-intentioned but misguided attempts to create a pest-free environment

through pesticide applications. Research shows that pesticide exposure can adversely affect a child's neurological, respiratory, immune, and endocrine systems, even at low levels. Additionally, children face unique hazards from pesticide exposure. They take in more pesticides relative to their body weight than adults and their developing organ systems often make them more sensitive to toxic exposure.

Fortunately, pesticides are not necessary to create a healthy, pest-free learning environment. There are safe and effective ways of controlling pests, both in classrooms as well as outdoors on playgrounds and playing fields, using non-toxic and least-toxic methods. Beyond Pesticides has put together this back-to-school guide to help safeguard your kids from pesticide dangers at school. Use this list to start the new school year right and ensure that you are sending your kids back to a healthier and safer environment.

At Home

Be Wary of Bed Bugs.

The overuse of pesticides along with an increase in international travel has contributed to a recent surge in bed bug populations. Pesticides used against bed bugs are linked to cancer, hormone disruption, asthma, neurotoxicity, and more. They are also ineffective due to insect resistance. Fortunately, bed bugs do not transmit disease and can be controlled without toxic pesticides.

Spotting a lone bed bug at home or on the school grounds does not mean that you should panic. However, you should proceed with caution. Be sure to vigilantly check backpacks, clothing and school supplies for bed bugs.

If you do discover an infestation, there are safe steps you or a pest control specialist can take to neutralize the problem without resorting to toxic and ineffective chemicals. Several steps you can take to prevent bed bugs include sealing crevices, eliminating clutter, vacuuming, laundering fabrics, encasing mattresses and box springs, and steam or heat treatment if bed bugs are found.

More information on how to identify, prevent, and manage bed bug infestations can be found on Beyond Pesticides' Bed Bug web-



Beyond Pesticides' Guide to a Pesticide-Free School Year

page at www.beyondpesticides.org/bedbugs.

Look Out for Lice.

Back-to-school season often coincides with lice outbreaks. Anyone can get head lice, no matter how often you wash or comb your hair. Lice are a common concern for elementary school-aged children, but toxic lice shampoos are not necessary. Products containing lindane and permethrin have been linked to cancer, neurological damage, and more. Fortunately, non-chemical treatments such as directed hot air, enzymes, and specialized lice combs can be far more effective at controlling this problem.

Head lice management involves the basic steps of education, prevention, monitoring, and control. Following these steps should prevent a serious infestation from occurring in your home or school. Simple precautions such as telling children not to share combs, hats, and blankets are a good start in preventing the spread of lice. If you do find lice, there are simple and safe ways to get rid of them. One effective procedure involves combing through oiled hair with a special nit comb (available at most pharmacies) and drowning any lice you find in soapy water.

Learn more in our factsheet, *Getting Nit Picky About Head Lice* (bit.ly/nitpicky).

At School

Improve Your School's IPM Program.

A strong integrated pest management (IPM) program is one of the best ways to eliminate pesticides in school buildings.

IPM is a program of prevention, monitoring, and control that offers the opportunity to eliminate or drastically reduce pesticides in schools, and to minimize the toxicity of and exposure to any products that are used. Improving a school's pest management program requires perseverance, as administrators may be uninformed.

A good IPM program will have a strictly defined process for managing pest problems and will include the six IPM essentials: monitoring pest levels, keeping records, developing action levels, adopting preventive measures, establishing criteria for chemical use, and evaluation of the program.

To learn more about how to improve your school's pest management policy, both indoors and outdoors, see our School Organizing guide: bit.ly/schoolorganizing.

You can also help support the development of a national school IPM policy by educating your Congressional Representative on the *School Environment Protection Act*. See bit.ly/SEPAaction.

Eat (and Grow) Organic Food.

In addition to serious health questions linked to actual residues of toxic pesticides on the food we eat, our food buying decisions support or reject hazardous agricultural practices, protection of farmworkers, and stewardship of the earth. Buying certified organic food is the only way to be sure that what you and your family eat comes from a system that rejects hazardous synthetic chemicals. There has been documented evidence showing that children fed a pure organic diet have significantly lower levels of pesticides in

their system than children fed a diet of conventionally produced food. If you are unable to eat all organic, purchase organic varieties of the foods you and your kids eat most commonly.

It's easiest to go organic when you grow organic. School gardens and other farm-to-school programs teach children where food comes from and establish healthy relationships with food and the natural world. An organic garden starts with healthy soil using natural sources of fertility such as compost, and schools have a great built-in source of potential compost feedstock in kitchen scraps, cafeteria leftovers, and turf clippings.

You can increase the amount of organic food your child eats while decreasing his or her exposure to toxic pesticides and lessening your impact on the environment by asking your school to adopt an organic lunch program or helping to start an organic school garden. For more information, see *School Lunches Go Organic* (bit.ly/organiclunches) and *The Organic School Garden* (bit.ly/schoolgardenorganic).

In the Field

School playing fields and playgrounds can be some of the most pesticide-laden areas of a school. Many officials and groundskeepers think that the only way to ensure good turf growth is with chemical pesticides and synthetic fertilizers. However, many schools around the country are realizing that organic management can create full and healthy turf while keeping toxic chemicals away from children.

Chemicals commonly used on athletic fields can cause numerous health risks to children. The use of these chemicals on playing fields is particularly troubling because children come into direct contact with the grass, and have repeated, prolonged exposures.

In addition to keeping dangerous chemicals off of playing fields, an organic system of "feeding the soil to feed the plant" creates healthier turf. Using compost and other natural sources of fertility make plants less likely to contract diseases and helps them fight off pests.

Although opponents often claim that organic management is more expensive, a 2010 study found that organic turf management systems cost as much as 25% less than conventional systems.

Learn more about organic management of school fields in our *Pesticides and Playing Fields* fact sheet (bit.ly/safefields). Find out more about safe, organic land care at our *Lawns and Landscapes* page at www.beyondpesticides.org/lawn.





ChemicalWatch Factsheet

INDOXACARB

What is Indoxacarb?

Indoxacarb is a broad spectrum foliar insecticide used to initially control lepidopterous insects, like moths, in their larval stages. These include agricultural pests like the beet armyworm, cotton bollworm, the cabbage looper and leafhoppers. However, it also has broad spectrum activity on other pests, such as ants and cockroaches, and various plant bugs. It is manufactured by DuPont and was first conditionally registered in the U.S. in 2000. Indoxacarb has several formulations, including tablet, broadcast granule, water dispersible, granule, and suspension concentrate, and it is currently marketed under the trade names, Steward,[™] Advion, Avaunt,[™] and Provaunt. It is registered to be used on various commodities, including apples, pears, lettuce, cabbage, corn, soybeans and cotton. Indoxacarb is also currently registered for residential and commercial sites for control of ants, cockroaches, wasps, centipedes, stinkbugs, and other household pests, including on cats and dogs for fleas.

Indoxacarb is typically a 75:25 mixture (DPX-MP062) of its two enantiomers (stereoisomers) – with one enantiomer responsible for the insecticidal activity. Indoxacarb is touted by industry as a “reduced-risk” pesticide and new organophosphate replacement. However, serious health effects have been observed to be associated with indoxacarb exposure in studies.



Mode of Action

Indoxacarb is in a new class of chemistry with a new mode of action. It belongs to the oxadiazine chemical family. Indoxacarb interferes with a group of ion channels by inhibiting the flow of sodium ions into nerve cells. This flow of sodium ions is essential to nervous system functioning. Disruption of these channels causes tremors, cessation of feeding, paralysis and death of insect pests. Lapeid, et al. observed that indoxacarb acts in a manner distinct from other sodium channel modulators (e.g. pyrethroids), in that it acts to block voltage-dependent sodium channels. As a result of this mechanism, indoxacarb is considered a voltage-dependent sodium channel blocker. Insects are exposed via ingestion of treated foliage/fruit and direct physical contact. It may take days for insects to die after exposure.

Acute Toxicity

Acute toxicity studies suggest that indoxacarb can cause skin sensitization. EPA has classified indoxacarb as a moderate dermal irritant (acute toxicity category III). Indoxacarb is moderately toxic to female rats via the oral route and is classified in toxicity category II for acute oral toxicity. It is readily absorbed after oral ingestion and extensively metabolized by the liver. No accumulation in tissues has been observed. There is evidence of lung damage in the acute inhalation studies with both indoxacarb mixtures. “Lung

noise” is observed and indicates the development of acute lung injury and high permeability pulmonary edema. This is attributed to an oxidant generated during indoxacarb metabolism.

Indoxacarb shows some signs of neurotoxicity after acute exposures in rats. A decrease in motor activity occurs in females after a single dose of 100 milligrams per kilogram body weight (mg/kg). Other acute neurotoxicity studies find decreased forelimb grip strength and decreased foot splay at the high doses. Indoxacarb causes some developmental effects in laboratory animals at doses that also cause maternal effects.

Chronic Toxicity

The main adverse effect of indoxacarb after repeated ingestion

ChemicalWatch Stats

CAS Registry Number: 173584-44-6

Chemical Class: Oxadiazine

Use: Broad spectrum insecticide for chewing and suckling insects, fire ants.

Toxicity rating: Toxic

Signal Words: Caution

Health Effects: Neurotoxic and hematological effects, lung damage.

Environmental Effects: Toxic to honey bees and other beneficial insects, birds and fish. Generally persistent in soils.

or application of a large quantity to the skin is a reduction in the number of red blood cells (anemia) observed in rats and dogs. There is depletion of blood-forming elements in the bone marrow and lymphoid organs in some studies with mice and rats. This reduction in the number of red blood cells is likely caused by the damaging effects of a metabolite. In oral toxicity studies in dogs, hemolytic anemia is observed as indicated by decreased red blood cells, increases in platelets, and secondary histopathologic findings indicative of blood breakdown. Hemolytic effects are only observed in chronic studies with female rats. Subchronic (28 days) inhalation toxicity of indoxacarb in rats is characterized by increased spleen weights, increased pigmentation and hematopoiesis in the spleen, and hematological changes.

There is no evidence that indoxacarb damages genetic material or leads to an increase in cancer. EPA classified indoxacarb as “not likely” to be carcinogenic to humans. Studies have shown that there is a higher sensitivity of female rats to the toxic effects of indoxacarb.

Developmental and Reproductive Effects

Indoxacarb causes some developmental toxicity in the offspring of pregnant rats and rabbits, at doses that also cause maternal toxicity. A decrease in fetal weights and the numbers of live fetuses per litter is seen at high doses, along with maternal toxicity effects (increased mortality, decreased mean body weights, body weight gain and food consumption). In a two-generation reproduction study in rats, no reproductive effects were observed at the highest dose tested, which was 6.4 mg/kg/day. However, maternal toxicity, characterized by reduced body weight gains, body weights, food consumption and increased spleen weights, occurs at a dose of 4.4 mg/kg/day.

Neurotoxicity

Neurotoxicity is observed in several studies in both rats and mice. Symptoms are similar to acute exposures and are characterized by weakness, head tilting, and abnormal gait or mobility with inability to stand. Some of these signs occur at fatal doses. There is no evidence of susceptibility from either *in utero* or neonatal exposure to both rat and rabbit young. Clinical signs, (e.g. depression, salivation, abnormal gait and head tilt) are observed in chronic animal feeding studies with mice at 14 mg/kg/day and 20 mg/kg/day for males and females respectively. Learning and memory parameters are affected in the pups in the developmental neurotoxicity study in rats.

Volatility

Indoxacarb also has a low vapor pressure $<1.0 \times 10^{-7}$ mmHg, making it a relatively non-volatile rating. However, scientists have found that temperature and humidity are significant factors influencing pesticide volatility. High temperature and low humidity increase volatility, and UV radiation and the types of microorganisms present affect how quickly a substance vaporizes and enters

the air. Also, sealed buildings and air flow play a role in determining air quality and the levels of pesticide residues present indoors. Under any conditions, all substances will volatilize, albeit to different degrees.

Metabolites

Indoxacarb is extensively metabolized and the metabolites are eliminated in the urine, feces, and bile. The metabolite profile is dose-dependent and varies quantitatively between males and females. There are several metabolites associated with indoxacarb and they bear one of two ring structures; the indeno or trifluoromethoxyphenyl groups. Of these, the trifluoromethoxyaniline (IN-P0036) metabolite has been identified as the likely metabolite causing oxidative damage to red blood cells in laboratory animals exhibiting hemolytic anemia after indoxacarb exposures. The IN-JT333 metabolite is commonly observed in animal fat. Several metabolites result in the environment, including IN-JT333, IN-JU873, IN-KG433, IN-KT413, IN-MK638, IN-MK643, IN-ML438.12 Some are more persistent and ecotoxic than others.

Ecological Effects

Indoxacarb is classified as moderately toxic to avian species on an acute dietary basis, especially to the bobwhite quail. The metabolite IN-JT333 is slightly toxic to birds on an acute oral basis. Indoxacarb and the metabolite IN-JT333 are highly toxic to rainbow trout and bluegill sunfish. A minor metabolite, IN-JU874, is slightly toxic to rainbow trout. Indoxacarb and its metabolites are thus classified as moderately to highly acutely toxic to freshwater and estuarine/marine fish and moderately to very highly acutely toxic to freshwater and estuarine/marine invertebrates. Indoxacarb and IN-JT333 are also slightly toxic to earthworms. The metabolite IN-MP819 has been shown to exhibit greater toxicity to aquatic invertebrates than indoxacarb.

Beneficial Insects Honey Bees

Indoxacarb and its metabolites are considered to be highly toxic by contact, but practically non-toxic by dietary intake to bees, based on laboratory studies. The insecticide was found to be moderately toxic to the honey bee when laboratory bees were given a honey solution containing 7.2ug a.i./bee. However, the registrant, DuPont, contends that there is a low impact on honey bees after indoxacarb has dried. It is unknown what impacts to foraging bees would result from applications at the maximum proposed rate for indoxacarb.



Other Non-target Insects

The Asian lady beetle's (*Harmonia axyridis*) survival, development, and reproduction rates are reduced even at reduced application rates of indoxacarb. Various parasitic wasp species (*Aphidius colemani*; *Diaeretiella rapae*) experience increases in mortality after exposures to low doses of indoxacarb sprayed on plants. Other non-target species –pirate bugs, beetles and other arthropods– are also adversely impacted.

Environmental Fate

Indoxacarb has an exceptionally complex degradation scheme, with the main breakdown products being IN-KT413 and IN-JT333. Indoxacarb undergoes rapid decomposition in terrestrial environments through microbial degradation, which is an important degradation pathway in soil. Under aerobic conditions, IN-JT333 is rapidly formed (after one day), followed by IN-KG433. Several other minor degradation products are also formed. Under anaerobic conditions, indoxacarb is more persistent, having a slower degradation rate. Indoxacarb has a moderately high soil sorption coefficient (Koc) of 2200- 8200, indicating a relatively low soil mobility and low probability of leaching into groundwater. However, as a result it is persistent in soil with aerobic half-lives ranging from 3 to 693 days. The metabolite IN-JT333 has an even lower soil mobility and is thus more persistent in soil.

In water, indoxacarb degrades quickly –with a half-life of about 1 day at pH 9, but degrades slower at lower pHs (e.g. half-life ~500 days at pH 5). As a result, residues of this chemical in water resources can be expected. The main breakdown product in water is IN-KT413. In sunlight, indoxacarb breaks down with half-lives of 3.2–4 days in water, but is very slow on soil with a half-life of 139 days.

Indoxacarb has no reported adverse effect on non-target terrestrial plants, and no phytotoxic effect on eight crops in field efficacy testing.

Resistance

Indoxacarb has been advertised as an important new tool in resistance management programs due to its unique mode of action, not shared with other classes of pesticides to which certain pests have become resistant. However, in the relatively short time since it has been in use, a few cases of resistance have appeared. Resistance to indoxacarb has been documented in Hawaiian populations of the diamondback moth (*Plutella xylostella* (L)). The cotton bollworm (*Helicoverpa armigera*), a major pest in cotton and highly resistant to

several conventional pesticides, is also found to have a three-fold tolerance to indoxacarb. The obliquebanded leafroller (*Choristoneura rosaceana*), on the other hand, has been found to be highly resistant to indoxacarb in the U.S., even before its field use. One study in New York found that house flies exposed to indoxacarb produce a New York indoxacarb-resistant (NYINDR) strain, with more than 118-fold resistance after three generations.

Regulation

DuPont was given a conditional registration for indoxacarb in October 2000 and was designated by the EPA to be a “reduced-risk” pesticide. The agency found that there was a potential for acute and chronic dietary exposure to indoxacarb and its isomer in drinking water, but concluded that the aggregate exposure and risk did not exceed any levels of concern. The agency also reduced the *Food Quality Production Act* (FQPA) safety factor to 1X, instead of the 10X safety factor used to protect children. Tolerances for use on certain fruit, leafy greens, vegetables and corn are set. Several data gaps exist for the environmental fate of indoxacarb’s many degradation products.

A fully cited version of this factsheet can be found on Beyond Pesticides website at www.beyondpesticides.org/gateway.

Alternatives to Indoxacarb

For effective, long-term structural and agricultural control of insect pests, a sound, defined integrated pest management (IPM) plan should be implemented. This includes monitoring, sanitation, prevention, and use of least-toxic chemical alternatives as the last resort.

To manage pests:

- Caulk or repair any holes or openings around baseboards, water pipes, outlets, doors, windows and in walls and ensure doors are equipped with weather stripping.
- Practice good sanitation methods (e.g. keep areas free of clutter from papers and cardboard boxes). Store food in tightly sealed containers
- Secure and dispose of trash in containers with tight fitting lids

Use Least-Toxic Alternatives. If the problem persists after trying non-chemical interventions, apply least-toxic alternatives, such as non-volatile boric acid, diatomaceous earth or silica gel to cracks and crevices where pests hide: inside and behind cabinets and appliances, wall cavities and under sinks. [Boric acid/borates are widely available in various formulations like bait stations, powders, gels or pastes. To avoid exposure to boric acid dust, follow label directions and use caution when applying. Boric acid products should not be used anywhere children or pets can access.]

“By their very nature, chemical controls are self-defeating, for they have been devised and applied without taking into account the complex biological systems against which they have been blindly hurled. The chemicals may have been pretested against a few individual species, but not against living communities. . . To assume that we must resign ourselves to turning our waterways into rivers of death is to follow the counsel of despair and defeatism. We must make wider use of alternative methods that are now known, and we must devote our ingenuity and resources to developing others.” —Rachel Carson, *Silent Spring*

Silent Spring

continued from page 1

species of shrubs and vines in the eastern states that are an important source of food for wildlife. She raises concerns about the senseless destruction of habitat, explaining her concern as follows: “Honeybees and wild bees depend heavily on such “weeds” as goldenrod, mustard and dandelions for pollen and serves as the food of their young. Vetch furnishes essential spring forage for bees before the alfalfa is in bloom, tiding them over this early season so that they are ready to pollinate the alfalfa. In the fall they depend on goldenrod at a season when no other food is available, to stock up for the winter.” Ms. Carson says, “Such plants are “weeds” only to those who make a business of selling and applying chemicals.” And yet, she continues, “The “agricultural engineers” speak blithely of “chemical plowing” in a world that is urged to beat its plowshares into spray guns.”

The Real Cost of Toxic Chemicals

While toxic chemicals for land management are sold to the public and land managers as more cost-effective, Ms. Carson says, “[W]ere the true costs entered, the costs not only in dollars but in the many equally valid debits. . . , the wholesale broadcasting of chemicals would be seen to be more costly in dollars as well as infinitely damaging to the long-range health of the landscape and to all the varied interests that depend on it.” She implores us to consider in questions of agriculture and landscape management the interconnectedness of nature. The book provides example after example of the horrific death and destruction caused by pesticides that disturb the relationships between predators and prey, which escape from natural controls and rise to pest status. In another

context, she describes the connectedness as, “. . . the house that Jack built sequence, in which the large carnivores had eaten the smaller carnivores, that had eaten the herbivores, that had eaten the plankton, that had absorbed the poison from the water.”

Fifty years after the publication of the book, true pesticide costs are still not calculated by regulators who espouse the “benefits” of the chemicals they register as presenting “reasonable” risks. We are still not asking these questions when EPA, advancing chemical-intensive practices, registers pesticides that are marketed with synthetic fertilizers that create the cycle of dependency on deadly chemicals, which continuously threaten the natural balance. However, in the spirit of Rachel Carson, we are instructed by the federal organic law to ask these questions in regulating certified organic systems.

Effects at the Cellular Level

Ms. Carson writes about the impacts that pesticides have at the cellular level, turning our attention to the “functioning of the individual cell in producing the energy that is the indispensable quality of life.” She says, “The extraordinary energy producing mechanism of the body is basic not only to health but to life. . . Yet the nature of many of the chemicals used against insects, rodents, and weeds is such that they may strike directly at the system, disrupting its beautifully functioning mechanism.” Of course, she relates the science of exposure to nerve damage, enzyme imbalance, liver damage, genetic damage, reproductive problems, cancer (explaining there is no safe level), and psychological effects.

On exposure, Ms. Carson writes, “The contamination of our world is not alone a matter of mass spraying. Indeed, for most

of us this is of less importance than the innumerable small scale exposures to which we are subjected day by day, year by year, like the constant dripping of water that in time wears away the hardest stone. . .”

Change Is Possible

On cancer, Ms. Carson posits the challenge, “Isn’t it impossible even to attempt to eliminate these cancer-producing agents from our world? Wouldn’t it be better not to waste time trying, but instead to put all our efforts into research to find a cure for cancer?” In response, she cites Dr. Hueper (National Cancer Institute), who equated preventive management of disease organisms through public health measures in the 19th century to the need to eliminate cancer causing pesticides in the 20th century, rather than simply looking for “wonder drugs.” The cancer cure was elusive in 1962 as it is today, so the prevention and elimination strategies take on even more urgency.

In conclusion, Rachel Carson quotes author F. H. Jacob in England as saying, “The activities of many so-called economic entomologists would make it appear that they operate in the belief that salvation lies at the end of a spray nozzle. . . that when they have created problems of resurgence or resistance or mammalian toxicity, the chemist will be ready with another pill. That view is not held here. . . Ultimately only the biologist will provide the answers to the basic problems of pest control.”



Ultimately, there is no better case for organic than *Silent Spring*.

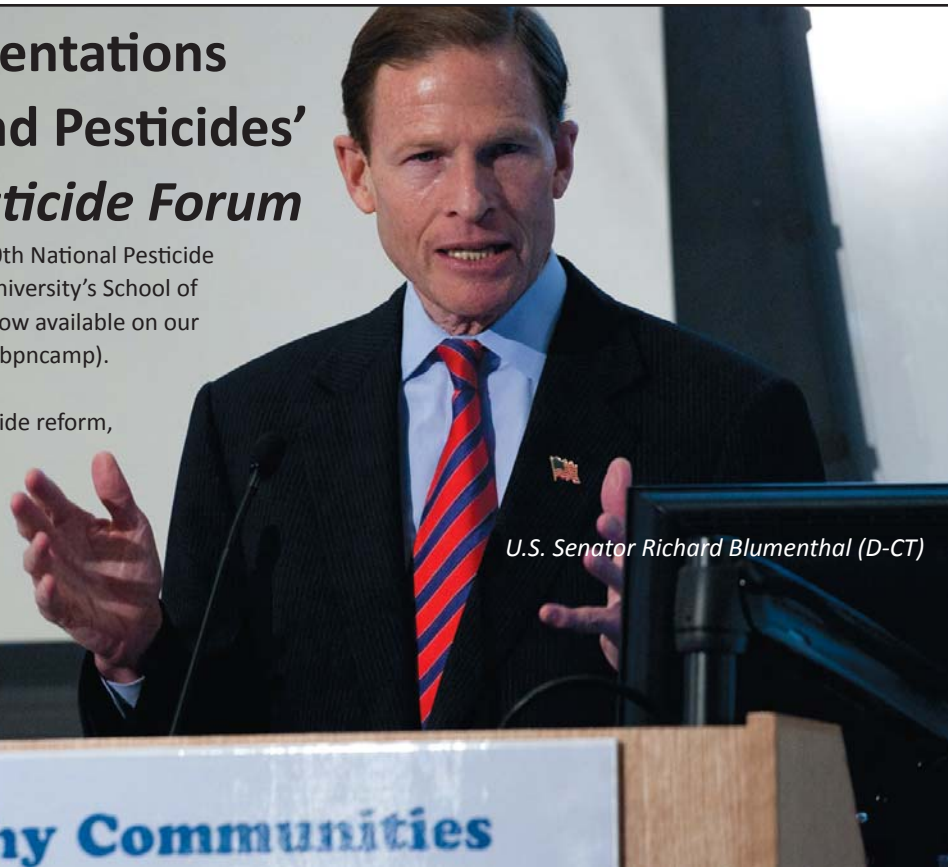
Jay Feldman is executive director of Beyond Pesticides.



Watch presentations from Beyond Pesticides' 30th National Pesticide Forum

Videos from *Healthy Communities*, the 30th National Pesticide Forum, held March 30-31, 2012 at Yale University's School of Forestry and Environmental Studies are now available on our YouTube channel (on www.youtube.com/bpncamp).

The conference featured leaders in pesticide reform, public health, organic agriculture, and alternative pest control as well as many community leaders, local activists, and elected officials.



U.S. Senator Richard Blumenthal (D-CT)

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