Pesticides and You

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

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Got Bed Bugs? Don't Panic.

Bed bugs do not transmit disease and
can be controlled without toxic pesticides

See inside for a series of articles on bed bugs:
Got Bed Bugs Factsheet; Bed Bug Policy; Pesticide Resistance; ChemWatch Factsheet: Propoxur

Also in this issue:
Keeping Organic Strong: How you can influence organic standards, *Beyond Pesticides launches a new webpage to engage the public in decisions to keep organic strong*; **Teaming with Microbes: The organic gardener's guide to the soil food web**

Managing Bed Bugs. . .The Challenge Continues

Bed bugs are the hot topic of conversation these days. When I discussed this in our last issue, we dubbed the situation the *Bed Bug Frenzy*. The frenzy continues, so we devote most of this issue of *Pesticides and You* to bed bug management that utilizes preventive practices by keeping the insect out of the places where we live, work and recreate, utilizing heat treatment when necessary. In this context, we draw attention to bed bug resistance to pesticides, a biological process that results from the typical pesticide-dependent strategies that conventional pest control relies on.

Regulating with alternatives in the forefront

EPA has stepped up to educate the public on bed bugs and explains on its website that chemical treatment "alone" will not eliminate the insect problem. It is something of a milestone for EPA to suggest that the most effective program incorporates monitoring, inspecting, cleaning, and non-chemical treatments. Still, chemical treatments are mixed in among their suggested tactics, with the important caveat that only an integrated approach works. Meanwhile, EPA acknowledges the fact that pesticides may not even work, stating, "[B]ed bugs populations in different geographic areas of the country have developed resistance to many pesticidal modes of action. If you're dealing with a resistant population, some products and application methods may only serve to make the problem worse."

Here's where we differ with EPA. Because of the hazards, pesticides should only be used as a last resort and then only least-toxic pesticides (which we define on our website as not linked to cancer, birth defects, genetic damage, neurological and respiratory impacts, and environment effects) should be used. EPA always urges people to read the pesticide label, which does not disclose the full range of hazards and uncertainties associated with a pesticide's use. Comprehensive information on pesticide hazards and uncertainties is not transparent to the consumer, farmer or pesticide applicator who chooses to use a product. And the myth of safety (it's registered by EPA, it must be safe) is still commonplace in the market. At the same time, an increasing number of consumers (like you the readers of *PAY*) and companies are taking a safer path.

Instead of alerting people to the potential dangers and uncertainties associated with pesticides and urging people to try the non-chemical approach first (sealing cracks, crevices and entryways, use of mattress encasements, etc.), EPA embraces those who say that toxic pesticides are just another tool in the toolbox. In this context, pesticides are given equal standing with cultural practices and non-chemical methods. Creating a prioritized approach would go a long way in helping to prevent the bed bug situation and others like it, brought on, in part, by a regulatory system that promotes pesticides among the preferred solutions alongside other approaches that are known to work without pesticides. This orientation in itself promotes insect, rodent and weed resistance because of extraordinary amounts of unnecessary pesticide use.

In fact, EPA's charge to protect health and the environment from "unreasonable adverse effects" under federal pesticide law (*Federal Insecticide, Fungicide and Rodenticide Act*, FIFRA) would be best advanced by rejecting the "reasonableness" of the hazardous effect (even a risk below its current threshold of acceptable risk) if there were a method that effectively eliminated that hazard and the uncertainties associated with untested effects and chemical mixtures. Now is a good time to ask EPA officials to use their statutory authority to fully integrate in their determination of "acceptable risk" (under the "unreasonable adverse effects" standard) an analysis of the reasonableness of the risk, in light of the availability of less or non-toxic alternatives. Many people try to do this in the marketplace, when they choose products that do not contain, for example, the hazardous antibacterial triclosan (see p5 in this issue), hazardous cleaners and other products, or buy organic. Until this reform is made, EPA will allow the unreasonable release of toxicants that promote insect resistance, creating a pesticide treadmill effect that requires more toxic pesticides to treat an escalating problem that requires more pesticides, and so on.

Organic webpage

With organic being the solution to pesticide pollution, we need to fully engage the public in the decisions of the National Organic Standards Board (NOSB) in regulating organic and protecting its integrity. In this issue, we launch our *Keeping Organic Strong* webpage to track ongoing issues and encourage the public to weigh in.

Here is the challenge we face. Issues of importance continually emerge before the NOSB that go to central questions, such as allowable products in organic production, the classification of materials as synthetic or nonsynthetic, sulfites in organic wine, animal welfare and stocking rates, to name a few. Sometimes an issue arrives before the board as a petition from a group or manufacturer that wants to allow a new method or material. Other times, the board's review is a function of a five-year sunset evaluation to consider new developments and science. Regardless, the process, to work effectively, requires public involvement through the public comment period, with written submissions before the meetings or in person at the meeting. With this webpage, we seek to bring larger numbers of consumers and farmers into the decision making process to represent their interests and perspectives on the core values associated with the organic production process.

A huge thank you to all those who supported Beyond Pesticides during out year-end appeal! Best wishes for the new year.

Jay Feldman is executive director of Beyond Pesticides.

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Mice are driving me mad!

Can you please give me advice? We seem to have a rodent problem in the roof of our house. We regularly wake up at three or four in the morning to hear scratching and scraping sounds; sometimes it feels as if it is behind the walls. I have contacted a pest control company that thinks it sounds like mice and told me they would treat the area with anticoagulants, either bromadiolone or difethialone. They would leave bait in the attic and let the mice eat it and die over several days.

I'm worried about this because I'm pregnant and have a toddler, so I'd like to know if there is a risk of me being exposed to the mice poison while it's in the roof (i.e. from it vaporizing)? Could the mice track it into the house; will they carry it with them or will it come out in there feces or urine?

I have considered using traps but my husband thinks that it sounds like we have too many rodents to deal with the problem. What is the safest rodenticide? Are either bromadiolone or difethialone safe, or should I look at the non-anticoagulant rodenticides? Please give me your advice so we can try to deal with this problem somehow.

Thank you - Alison

It's that time of the year when the weather gets colder and mice enter people's homes for warmth. Luckily, there are a couple of techniques you can use to get rid of them without exposing yourself and your family to harmful chemicals, which include removing sources of food, access to shelter, and a couple of strategically placed traps.

First, you are right to be concerned about the toxicity of anticoagulants and other chemical controls. Though the chemicals you mentioned, bromadiolone and difethialone, are both relatively non-volatile, they are both extremely toxic and may not be very effective as there are some reports of mice gaining resistance to anticoagulants. For details on the hazards of rodenticides, you can see our factsheet, which can be found on the Alternative Factsheets webpage under the Info Services tab on our homepage.

It's important to note that anticoagulants do not work immediately. Some require several doses while others take several days to work. Another thing to consider is that mice nibble rather than eat large quantities at a time, so any rodenticide that you consider will need to be used at high concentrations, which means an increase in the hazards to nontarget species (like your pets and kids) that inadvertently

happens when poisons are used.

We don't recommend it, but if you do go the poison route, use bait boxes which are plastic or metal boxes with the anticoagulant bait placed inside. The bait is better protected from the elements, humans and pets are more protected from unintentional exposure, and the amount of bait being taken by the mice can be more carefully monitored. In fact, EPA requires that bromadialone be placed in a tamper resistant bait station to prevent accidental exposure. It's critical to follow the label instructions and to use bait boxes carefully making sure they are placed properly.

As distinguished from the use of traps, which you'll read about below, mice can wander away from bait stations and die in areas inaccessible to people, making them difficult to remove, resulting in odors and an attractant to other pests. Also, according to the University of California, after a pest dies from consuming an anticoagulant, another animal (perhaps your pet) can die or become sick by consuming the poisoned carcass. Pest control companies may tell you that these anticoagulants cause thirst in the mouse, forcing them to leave the house to look for water. However, the condensation on pipes, leaky faucets, or any other source of water in the warm shelter of your home is just as attractive, if not more so, to a mouse than the great outdoors.

Traps are really the best solution, especially when exclusion is difficult. And, as far as choosing a trap goes, you have a few options: classic snap traps, glue traps or

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. Comments will be edited for length and clarity, and unless you specify otherwise, your information will remain anonymous.

There are many ways you can contact us. Join other members and activists in discussions on our Facebook page www.facebook.com/beyondpesticides or follow us on twitter www.twitter.com/bpncamp! And as always, you can send questions and comments to:

Beyond Pesticides, 701 E Street SE, #200, Washington, DC 20003, or info@beyondpesticides.org

have-a-heart traps. Have-a-heart traps are viewed as the most humane because they capture the mouse without killing it, however since it sounds like you have a rather large infestation, this may not be the best option since you will need to make sure you release the mouse far enough away from your home and seal up any entry points so they can't get back inside. Snap traps and glue traps both capture the mouse and kill it. If you use a spring loaded snap trap, you may have to adjust it to make sure it's sensitive enough to capture the mouse. It's important to monitor these traps daily to clean up the dead rodent. Another trick is to use gloves when placing the traps because mice are sensitive to the smell of humans.

To make sure your traps (and the food you use as bait) are attractive to rodents, be sure to eliminate all other sources of food in your home. Don't leave food on counters or dirty dishes in the sink overnight and keep your stove top and kitchen floor clean from grease, spills and crumbs. Store dry foods in sealed containers that can't be chewed through or put it in the refrigerator. Pick up any uneaten pet food before going to bed or leaving for work.

To exclude mice from your home, cover and seal all openings and cracks that are bigger than a quarter of an inch, because a full-grown mouse can squeeze through an opening smaller than a dime! Caulk and seal openings around water pipes, electric wires, cables and vents. Make sure screens are in good shape and place screening material over areas that don't already have it. For a quick and easy fix, plug holes with steel wool.

Just remember - No method is going to be a permanent fix against mice and other rodents unless you eliminate entry points from your home and remove access to your food. It is important to get to the root of the problem. You can set out baits or traps, but as long as your house is an attractive place rodents will continue to make their way inside.

Seeking a Safer Community

I am increasingly concerned about the safety of household chemicals, like pesticides, and worry about the products that my neighbors (I live in a large apartment building) use too. Do you have any tools that I can use to help educate others on safer ways to deal with household pests?

Cathy

There are alternatives to pesticides for managing pests without exposing your family to pesticides. Look no further than our *Safer Choice* program webpage: www.beyondpesticides.org/saferchoice. This is our one-stop information source will help you avoid hazardous pesticides in your home, garden, community and on the food you eat. Here, you will find plenty of tools you can download, including brochures, fact sheets, a presentation, and door knob hangers to help you eliminate the toxic pesticides from your community.

Beyond Pesticides Daily News Blog

Beyond Pesticides' Daily News Blog features a post each day on the health and environmental hazards of pesticides, pesticide regulation and policy, pesticide alternatives, and cutting-edge science, www.beyondpesticides.org/dailynewsblog.

Excerpt from Beyond Pesticides original blog post (10/8/10):

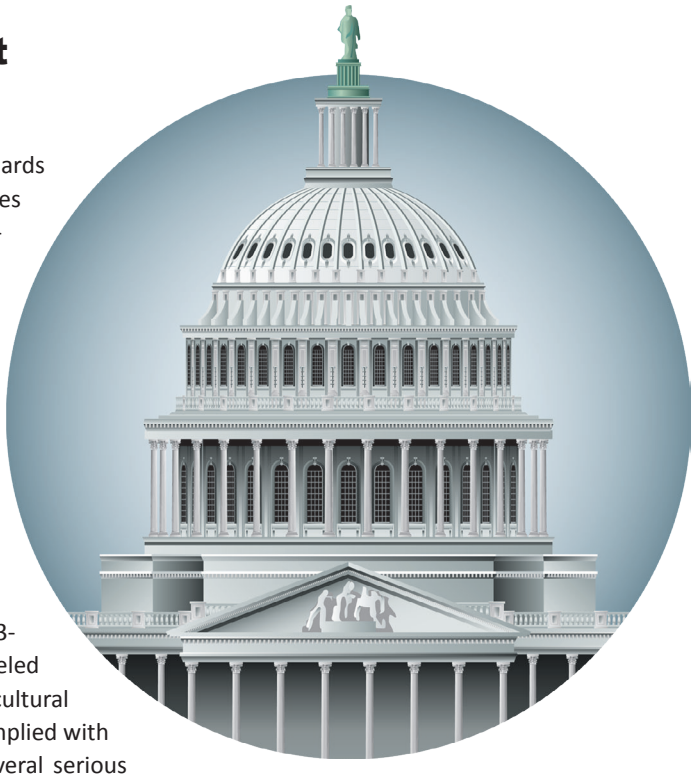
Two Culprits Linked to Bee Decline, More Research Needed

Scientists may have found the missing link behind the colony collapse disorder (CCD): a combination of a virus and a fungus, though more research is needed to determine the exact cause and effect that these two culprits have on CCD. Prior to this study, scientists have hypothesized that there are numerous factors, including pesticides, that depress the immune and nervous system of bees, creating a vulnerability to other factors, such as those identified in this study. Army and University of Montana entomologists collaborated and found the invertebrate iridescent virus and the fungus *Nosema ceranae* consistently marked a colony collapse.

Lorraine says:

Thank you for providing additional information about this. The news report I saw made no mention of pesticides. How could they not be part of the picture? Even if these organisms are responsible, wouldn't one think that pesticides would make bees more vulnerable to them?

USDA Organic Program Says Oversight Improved under Obama Administration



Miles McEvoy, U.S. Department of Agriculture (USDA) deputy administrator for the National Organic Program (NOP), said that USDA has implemented 12 of the 14 recommendations for improving organic oversight by the USDA Inspector General (IG). This follows an audit of the program's management from October 2003 through July 2009. In an October 2010 interview with the trade publication *The Packer*, Mr. McEvoy said he is pleased with the NOP's progress and expects the last two recommendations to be implemented by the end of the year. The deputy administrator said the NOP has strengthened pesticide residue testing and stepped up accreditation, compliance and penalization of violators, and added that the overriding goal is protecting organic integrity. "We're in the process of implementing a very comprehensive worldwide program to make sure that organic integrity is protected all the way from the farm to the marketplace," Mr. McEvoy said. "There's still a lot to do, but we've made a lot of progress and have done a lot the last year."

While NOP has rigorous standards and certification procedures unparalleled in chemical-intensive agriculture, it was criticized for straying from its legal requirements during the Bush Administration. Grassroots pressure led to two USDA Inspector General (IG) investigations. In March 2010, the IG completed its second audit and issued its report, *Oversight of the National Organic Program* (01601-03-Hy). While most organic labeled produce and processed agricultural products on store shelves complied with federal law, the IG found several serious problems with the implementation of the program between October 2003 and July 2009. These issues range from organic inspectors without the proper procedures in place to comply with NOP regulations, to a complete lack of required residue testing and instances where USDA knew companies were selling conventional products as organic without timely action taken.

A full analysis of the IG report appears in the Spring 2010 issue of Pesticides and You (Vol. 30, No. 1).

Members of Congress Urge FDA to Ban Triclosan

Citing a petition to ban the non-medical uses of triclosan filed by Beyond Pesticides, Food and Water Watch, and 82 other groups, Members of Congress, led by Rep. Louise Slaughter (D-NY), sent a letter to the U.S. Food and Drug Administration (FDA) urging the agency to ban triclosan due to the hazards that the chemical poses, including antibiotic resistance, and its potential contribution to higher health care costs. The letter concludes that "triclosan is clearly a threat to our health," citing the presence of triclosan in the human body; bacterial resistance to antibiotic medications and antibacterial cleaners, the potential for endocrine disruption, wastewater contamination, the threat of destroying ecological balance, and the fact that triclosan is no more effective than soap and water.

Previously, Rep. Ed Markey (D-MA) submitted letters of concern to both EPA and FDA. In FDA's response, it acknowledges that soaps containing triclosan offer no additional benefit over regular soap and water. FDA stated that "existing data raise valid concerns about the [health] effects of repetitive daily human exposure to these antiseptic ingredients" and announced plans to address the use of triclosan in cosmetics or other products. FDA also expressed concern about antibiotic resistance, as a result of using antibacterial products, and triclosan's potential long-term health effects. Despite these concerns, the agency has not proceeded with rulemaking.

Take Action: *Join the ban triclosan campaign and sign the triclosan pledge. Avoid products containing triclosan and encourage schools, government agencies and businesses to use their buying power to go triclosan-free. Urge your municipality, institution or company to adopt the model resolution, which commits to not using triclosan. Details at www.beyondpesticides.org/antibacterial/triclosan.htm.*

Tell EPA to Ban Triclosan, Petition Allows for Public Comment on Hazardous Antibacterial Pesticide

On December 8, 2010, the U.S. Environmental Protection Agency (EPA) published for comment the petition to ban triclosan submitted by Beyond Pesticides and Food and Water Watch with the support of over 80 other advocacy and public health groups. The petition, filed January 14, 2010, identifies pervasive and widespread use of triclosan and the agency's failure to address triclosan's impacts on human and environmental health, conduct assessments for residues in drinking water and food, and emerging concerns related to antibacterial resistance and endocrine disruption. The petition cites various violations of numerous environmental statues, including the *Clean Water Act*, *Safe Drinking Water Act* and the *Endangered Species Act*.

Triclosan, now found in the bodies of 75% of the U.S. population, including pregnant women, is linked to endocrine disruption and can possibly interfere with fetal development. Triclosan overuse can also give rise to bacterial and antibiotic resistance. In the environment, triclosan leads to dioxin contamination, and contaminated fish and biosolids.

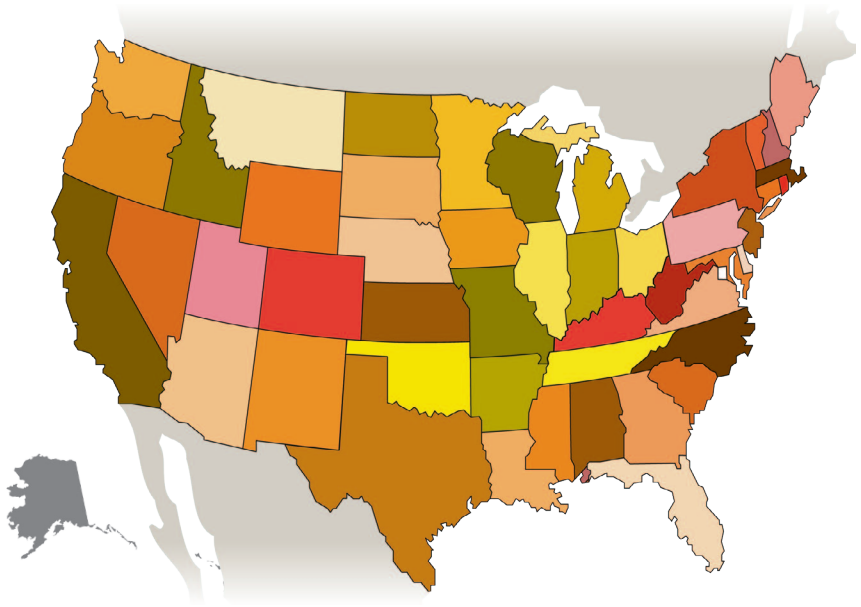
Your support is crucial at this moment! Let EPA know that triclosan is too toxic to remain in everyday consumer products like toys, clothing and kitchen utensils, given less toxic alternatives. You can send an email to Administrator Lisa Jackson or submit comments to the Federal Docket asking the agency to put human and environmental health first and ban triclosan today! For more information on how you can help get rid of triclosan, including sample comment language and information on the petition, visit www.beyondpesticides.org/antibacterial/triclosan.htm

Groups Call for Full Ban of Pesticide, Once Widely Used in Homes

Over 13,000 organizations and individuals, led by the Washington-state based Farm Worker Pesticide Project, sent a letter to the Environmental Protection Agency (EPA) on October 13, 2010 calling for a ban on the insecticide chlorpyrifos and a phase out of other organophosphate (OP) pesticides. Chlorpyrifos was phased out for residential use under a 2000 agreement between EPA and Dow Agrosciences, but continues to expose farmworkers and consumers through its use in agriculture. Chlorpyrifos is a neurotoxic insecticide whose use was found to exceed acceptable rates of illness, especially to children. By focusing on risk reduction strategies to come up with "acceptable," but unnecessary, rates of illness across the population, EPA virtually ignored the chemical's widespread use in agriculture that results in exposure to farmworkers, farm families and others living near agricultural areas. Prenatal and early childhood exposure has been linked to low birth weights, developmental delays, ADHD, and other health effects.

Beyond Pesticides considers EPA's 2000 chlorpyrifos settlement with Dow a classic failure of the risk assessment process under the *Food Quality Protection Act* (FQPA). Advocates have pointed to chlorpyrifos as the poster child for why risk assessment does not work to protect the public, workers and the environment, even with safer practices and products available in the marketplace. The agreement removed chlorpyrifos' residential uses, but retains all agricultural uses except tomatoes (allowable residues on apples and grapes were adjusted), golf course and mosquito spraying. The agency argued that it had adequately mitigated risks through the removal of high exposure uses to children in the residential setting, but ignored the special risks to farmworker children's exposure, as well as the availability of alternative agricultural practices and products that make chlorpyrifos unnecessary and therefore its risks unreasonable.

For more information on agricultural pesticides and farmworkers, and why it's important to eat organic, see Beyond Pesticides Eating with a Conscience database, www.EatingWithAConscience.org.



USDA Deregulates GE Alfalfa and Groups Plan To Sue

Environmental and public interest groups are extremely disappointed with the January 27th announcement that the U.S. Department of Agriculture (USDA) plans to fully deregulate genetically engineered (GE) alfalfa seed, despite the risks it poses to both organic and conventional farmers. This decision follows the agency's completion of the court-mandated environmental impact statement (EIS) for GE alfalfa. Secretary of Agriculture Tom Vilsack called for "coexistence" among GE, organic and conventional non-GE farmers, despite the clear recognition in the EIS that GE contamination of organic and conventionally grown crops presents a huge problem. The EIS also fails to take into account the documented increase in herbicide-resistant "super weeds" that is requiring the use of highly toxic herbicide cocktails for weed control on conventional farms. Likewise, USDA has not shown that contamination-free coexistence with deregulated GE alfalfa is likely or possible.

"We're disappointed with USDA's decision and we will be back in court representing the interest of farmers, preservation of the environment, and consumer choice," said Andrew Kimbrell, executive director for the Center for Food Safety. The National Organic Coalition (NOC), of which Beyond Pesticides is a member, also issued a statement criticizing the decision. Other critics of the announcement, cosponsors of the original *Organic Foods Productions Act*, Senator Patrick Leahy (D-VT) and Representative Peter DeFazio (D-OR), said, "This long approval process began as a search for a workable compromise, but it has ended as a surrender to business as usual for the biotech industry. USDA officials had an opportunity to address the concerns of all farmers, whether they choose to farm genetically altered crops, conventional crops, or organic crops, and to find a way for them to coexist. Instead, what we now have is a setback for the nation's organic and conventional agriculture sectors."

Genetically Altered Corn Contaminates Midwest Streams

A study by University of Notre Dame ecologists reveals that streams throughout the Midwest are contaminated with transgenic materials from corn crop byproducts, even six months after harvest. The transgenic corn has been genetically engineered (GE) to produce its own insecticide, a toxin from the soil bacterium *Bacillus thuringiensis* (Bt). The research team first identified transgenic materials from corn (pollen, leaves, cobs) as stream contaminants in 2007. The new study, "Occurrence of maize detritus and a transgenic insecticidal protein (Cry1Ab) within the stream network of an agricultural landscape," was published in the September 27, 2010 edition of *Proceedings of the National Academy of Sciences* (PNAS). The researchers write about their investigation of the fate and persistence of the material using a field survey of 217 stream sites in northwestern Indiana six months after crop harvest.

Previous research has overlooked the potential for crop byproducts from transgenic corn to enter and be dispersed by headwater streams. "Our study demonstrates the persistence and dispersal of crop byproducts and associated transgenic material in streams throughout a corn belt landscape even long after crop harvest," lead researcher Jennifer Tank, PhD concludes. The research emphasizes that there is a tight link between streams and adjacent agricultural fields and dispersal of crop byproducts that could affect ecosystems beyond field boundaries. GE crops are already known to contaminate conventional non-GE and organic crops through "genetic drift" and take a toll on the environment by increasing resistant insects and weeds, contaminating water and affecting pollinators and other non-target organisms. The long-term health effects of consuming GE food are still unknown. *More information at www.beyondpesticides.org/gmos.*

Industry Groups Quit "Sustainable Agriculture" Standard Process

In October, eleven groups representing chemical-intensive and biotech-based agricultural interests dropped out of the process to develop an American National Standards Institution (ANSI)-certified standard for sustainable agriculture, facilitated by the non-profit Leonardo Academy. The groups cited committee dominance "by environmental groups, certification consultants, agro-ecology and organic farming proponents" and an opposition to "modern agriculture" as their main reasons for resigning. The dropouts include the American Farm Bureau Federation, American Frozen Food Institute, American Soybean Association, California Seed Association, CropLife America, Grocery Manufacturers Association, National Corn Growers Association, National Cotton Council of America, and others. "These groups relentlessly pushed for molding the standard to validate industrial agriculture and high-tech genetic manipulation," says Jeff Moyer, farm director at the Rodale Institute and active member of the committee. "The model they propose confuses short-term profits for sustainability," he said.

As the Sustainable Agriculture Standard setting process was just beginning in 2008, Beyond Pesticides and the National Organic Coalition sent a letter to the Leonardo Academy voicing concerns over the proposed label being developed with the chemical industry at the table. The letter stated, "The National Organic Coalition is deeply concerned about the adverse impact that a sustainable agriculture label will have on the urgent need to increase our nation's organic acreage and production practices. The advancement of organic systems, as an alternative to toxic agrichemical practices, is the most effective way to (i) eliminate hazardous and synthetic pesticide and fertilizer use, (ii) protect those who work in agriculture, (iii) curtail threats to the environment and wildlife, and (iv) reduce the pressures on global climate change. The growth of the organic sector is critically needed for environmental, health and labor protection. To the extent that a standard and label are created for the term sustainable, it most certainly compromises key standards that are critical to our national and global health." *For more information on organic and "green" labels, read, "Making Sure Green Consumer Claims Are Truthful," published in the Summer 2008 issue of Pesticides and You (Vol. 28, No. 2).*

Two Culprits Linked to Bee Decline, More Research Needed

Scientists may have filled in another piece of the complicated colony collapse disorder (CCD) puzzle: a combination of a virus and a fungus, though more research is needed to determine the exact cause and effect that these two culprits have on CCD. Scientists hypothesize that there are numerous factors, including pesticides that depress the immune and nervous system of honeybees, creating a vulnerability to other environmental factors, such as those identified in this study. The researchers determined that the co-occurrence of the invertebrate iridescent virus (IIV) with the fungus *Nosema ceranae* consistently marked a colony collapse. It is important to point out that while this is an important step in solving the mystery of the bees, there may very well be more than just these two factors at play. "We truly don't know if these two pathogens cause CCD or whether the colonies with CCD are more likely to succumb to these two pathogens," said lead author Jerry Bromenshenk, PhD of the University of Montana. The study, "Iridovirus and Microsporidian Linked to Honey Bee Colony Decline," was published October 6, 2010 in the online science journal *PLoS One*.

Researchers had previously suspected and then dismissed *N. ceranae* because it was found in both healthy and failing colonies. Earlier this year, a study conducted by Penn State University found that there is widespread pesticide contamination of beehives. This research did not find a direct correlation from pesticides to colony collapse because, like the *N. ceranae* fungus, these chemicals are also present in healthy hives. What it does imply is that bees and their hives are being exposed to high numbers of toxic chemicals and that the synergistic, aggregate and cumulative effects from exposure need to be explored for their possible contribution to bee mortality, fitness and even potentially colony collapse. Pesticides, especially neonictinoids, have been previously implicated as a cause of CCD, and an earlier study criticized risk assessments for downplaying their potential role. The fact that this new study discovered a combination of two things as a cause for CCD highlights the importance of studying the effects of these materials in combination.

Group Sues California County Agency over Polluted Runoff

A lawsuit by the environmental group Monterey Coastkeeper argues that the Monterey County (California) Water Resources Agency is illegally allowing irrigation water polluted with pesticides and nitrates to flow into the Salinas River and Elkhorn Slough. The suit, filed October 21, 2010 in Monterey County Superior Court (Case # GNM108858), charges that the contaminated water violates public health standards and poses a threat to humans, fish and wildlife. This lawsuit seeks to set a statewide precedent in making a county agency responsible for water distributed to farmers. It is the first lawsuit to take action against a county agency in an attempt to enforce state water standards. The suit claims MCWRA illegally discharged waters with pollutants in excess of protective standards, did not file a report of waste discharge, failed to protect public resources, and created a public nuisance. The suit does not seek monetary damages, but asks for the discharge and pollution to stop.

An agricultural waiver protects owners and operators of irrigated cropland from prosecution for releasing toxic water. The suit states that this waiver does not apply to the county agency. The California Department of Pesticide Regulation says Salinas Valley has the highest percentage of tested surface water sites with toxic levels of pyrethroid insecticides and the highest application rate of these pesticides. Additionally, half of the sampled wells have nitrate concentrations above drinking water standards. *For more information, visit Beyond Pesticides' "Threatened Waters" webpage, www.beyondpesticides.org/water.*

"Organic" Factory Farms Create Unfair Competition, says Report

A report by the non-profit Cornucopia Institute focuses on widespread abuses in some organic egg production, primarily by large industrial agribusiness. The study, *Scrambled Eggs: Separating Factory Farm Egg Production from Authentic Organic Agriculture*, profiles the exemplary management practices employed by many family-scale organic farmers engaged in egg production, while spotlighting abuses at factory farms. It also contains a scorecard rating various egg brands on how their eggs are produced in accordance with federal organic standards and consumer expectations. According to the United Egg Producers, 80 percent of all organic eggs are produced by just a handful of its largest members. Most of these operations own hundreds of thousands, or even millions of birds, and have diversified into "specialty eggs," which include organic. Cornucopia Institute says that most of these giant henhouses provide no legitimate access to the outdoors, as required in the federal organic regulations.

After visiting scores of egg producers in nine states, the authors of the Cornucopia report also conclude that the vast majority of family-scale producers are complying with the organic regulations and meeting consumer expectations. The best producers with permanent housing profiled in *Scrambled Eggs* have plenty of pasture available surrounding their chicken houses, multiple popholes (doors) of adequate size, and maintain the birds by rotating them into separate paddocks, allowing a rest period for the pasture to recover. Laying hens on pasture-based farms tend to be under less stress —based on their greater opportunity to exercise and ability to engage in instinctive foraging behaviors that cut down on aggression toward their flock mates— and frequently live closer to three years instead of the one year that is common on industrial-scale farms.

Scrambled Eggs comes at a critical juncture for the organic poultry industry. The National Organic Standards Board (NOSB), the expert citizen advisory panel set up by Congress to advise the USDA on organic policy, has been debating a set of proposed new regulations for poultry and other livestock that would establish housing-density standards and a clearer understanding of what the requirement for outdoor access truly means. The industry's largest operators, along with their lobbyists, have been loudly voicing their opposition to requirements for outdoor space. The NOSB will be addressing the issue of chicken "stocking rates" in organic agriculture at its Spring 2011 meeting. *For more information on the NOSB and how you can weigh in on its decisions, see "Keeping Organic Strong: How you can influence organic standards" in this issue of Pesticides and You.*

Keeping Organic Strong

How you can influence organic standards

By John Kepner and Jay Feldman

Beyond Pesticides has launched a new organic action webpage, to engage the public in decisions by the National Organic Standards Board (NOSB) and help organic food production grow (www.beyondpesticides.org/organicfood/action). The NOSB was established by the Organic Foods Production Act (OFPA) to assist in the development of standards for substances to be used in organic production, make recommendations about whether a substance should be allowed or prohibited in organic production or handling, and advise the Secretary of Agriculture. Currently, Beyond Pesticides' executive director serves on the NOSB.

While the issues discussed here at times can seem wonky and esoteric, they are all central to the integrity of organic and questions critical to public perception of its commitment to natural, ecological, and humane practices. The public's voice –your voice– is a major factor in how important questions are resolved in the short- and long-term. As organic grows in the marketplace, its standards challenge our larger, chemical-intensive food production system to shed its polluting practices –harmful to health, the environment and the planet's sustainability– as simply unnecessary to achieving high productivity and quality.

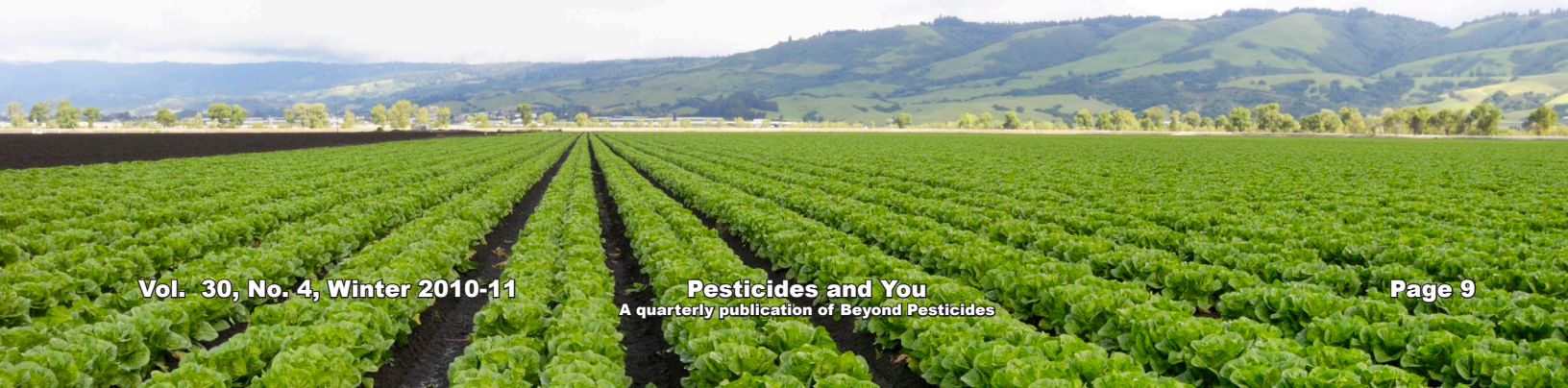
As we raise our voices to advance the integrity of the organic label, it is important to bear in mind the differences between organic farming and conventional, chemical-intensive agriculture. While organic agriculture embodies an ecological approach, conventional, chemical-intensive agriculture creates a dependency on toxic chemicals that poison the soil, as well as the air, water, and those who produce and consume the crops.

First and foremost, organic farmers adopt an organic systems plan (subject to recordkeeping requirements, inspection and certification), which incorporates strategies that include compost, crop rotation, cultural practices, and beneficial species. As a last resort, the organic systems plan may allow for the use of natural and approved synthetic chemicals on the "National List," which is subject to organic compatibility standards and a review by the NOSB –a process that includes a detailed checklist of possible health and environmental and biodiversity impacts, from production of the substance to use and disposal, and considers the essentiality of the chemical. In contrast, EPA's pesticide registration review does not evaluate the cradle-to-grave impacts of the chemical or the need for it –in light of the availability of alternative less and non-toxic management practices and substances.

Currently, of the 50 entries included on the "National List" of allowable synthetic production and processing aids, there are approximately 27 pesticides, including soap-based insecticides, pheromones and sticky traps. There are also nine prohibited natural substances, including arsenic and strychnine. In contrast, there are tens of thousands of synthetic chemicals approved for use by EPA in chemical-intensive agriculture, including hundreds of pesticide "active ingredients," in addition to chemical fertilizers, genetically modified organisms (GMOs), antibiotics, sewage sludge, irradiation, and nano-engineered substances.

Take Action: Making Your Voice Heard

The organic regulatory process provides numerous opportunities for the public to comment and petition on what is allowable in organic production. USDA maintains a National List, set by the NOSB, of the synthetic substances that may be used and the non-synthetic substances that are prohibited in organic production and handling. OFPA and National Organic Program (NOP - USDA's office on organic standards) regulations provide for the sunsetting of listed substances every five years and rely on public comment in evaluating continuing uses. The public may file a petition to amend the National List at any time. In both cases, sunset and petition, the NOSB is authorized by OFPA to determine a substance's status.



What Does "Organic" mean to you?

People bring a range of perspectives to organic agriculture. It can be defined by the things that are lacking –organic production should involve no pesticides, synthetic chemicals, or processing technologies you wouldn't have in your kitchen. You can think about it in terms of food value—organic food should be nutritious and safe to eat. And, it is understood to be ecologically-based agriculture, safe for the environment and workers. Still others think of the economic opportunity provided by a market for a premium product.

From its beginnings, the organic method has been all about the soil. The organic farming system regards the soil as a living organism. Organic gardening and farming literally grew out of the study of composting. As J.I. Rodale, the founder of Rodale Press, and the Rodale staff wrote in *The Complete Book of Composting*, "At the very foundation of good nutrition is the soil —soil that is fertile and alive, that is kept in shape to grow plants as nature meant them to be grown. The life and balance in this soil is maintained by returning to it those materials which hold and extend life in a natural cycle, and aid in replenishing the nutrients needed to produce healthy, life-supporting crops. Soils that lack vital plant nutrients cannot give these food values to what is grown in them." Rodale began referring to organic systems as regenerative agriculture to embrace the notion of constantly building the soil.

Hence the saying, "Feed the soil to feed the plant."

The *Organic Foods Production Act of 1990* (OFPA) was written to ensure that organic food meets all of these expectations. And it offers opportunities to engage in protecting our vision for an organic food production system. Under OFPA, organic agriculture embodies an ecological approach to farming that does not rely on or permit toxic pesticides, chemical fertilizers, genetically modified organisms, antibiotics and hormones, sewage sludge, or irradiation. Protecting the integrity of the organic label brings together the range of expectations that define "organic" to protect and build on the underlying standards of the law.

Recent NOSB Recommendations (October 2010 meeting)

The following recommendations were passed by the NOSB at its most recent meeting. It is important for the public to follow up with USDA's NOP to officially adopt (or reject) the recommendations of the NOSB in accordance with statuatory standards. See NOP's response to these issues at http://bit.ly/NOP-response-Fall2010. To weigh in on future issues, email NOP Deputy Administrator Miles McEvoy, Miles.McEvoy@ams.usda.gov. *More details on the following issues are available at www.beyondpesticides.org/organicfood/action.*

Organic hops in beer. The NOSB voted to require that all hops used in organic beer production must be organically cultivated. Previously, conventional hops have been allowed in certified organic beer under the five percent product content rule because organic hops were not found to be "commercially available." When the NOSB deems an organic ingredient unavailable, it can allow producers to display USDA's certified organic label if the non-organic ingredients make up less than five percent of the product's total weight, excluding water. In the case of organic beer, the main ingredient, barley, has always been organic because it constitutes the bulk of the product's weight.

The NOSB is recommending that hops remain listed until 2013 to give brewers two seasons to secure contracts for organically produced hops. According to NOSB's document, "This time interval formally recognizes the growth of organic hops' availability and yet allows brewers two growing seasons to secure their organic hops through forward contracting, making adjustments to future product formulations and specifications, and preparing their customers and consumers for the product changes anticipated, if any."

Ban on engineered nanomaterials. The NOSB passed a recommendation directing the USDA National Organic Program to prohibit engineered nanomaterials from certified organic products as expeditiously as possible.

Nanotechnology is the science and manipulation of chemical and biological materials with dimensions in the range from 1-300 nm. Because nanotechnology is such a new field, nanomaterials were not specifically addressed when OFPA was passed in 1990. While synthetic materials are already prohibited in organic production, unless specifically exempt, the NOSB recommendation will pressure NOP to block petitions seeking an exemption and keep nanomaterials out of food packaging and contact surfaces. The recommendation also provides clarification that nanosized particles of synthetic substances already included on the National List may not be used in organic production. The NOSB recommendation deals spe-

cifically with engineered nanomaterials and purposefully omits those that are naturally occurring (corrosion particles, sea spray) or incidentally created (through traditional production methods, such as grain milling and milk homogenization).

While there is overwhelming agreement to prohibit nanotechnology in organics generally, there is still confusion over the definition of what exactly should be prohibited and how to prohibit nanotech products in the organic industry. To deal with outstanding issues, NOSB has recommended that NOP host a symposium on this topic.

Apiculture/organic honey rules. Since honeybees are animals, the Livestock Committee of the NOSB takes responsibility for developing a recommendation for USDA standards to govern the production of organic honey and honey-related products. Because the biology and behavior of honeybees is so markedly different from other types of organic livestock, and because they fly and forage a wide area, specific standards are required to ensure consistency between organic certifiers and to ensure that organic honey meets consumers' expectations for organic products.

Among other practices, the NOSB recommendation requires that organic bee keepers establish a 1.8 mile (3km) radius organically managed "forage zone." For property within the zone that is not managed by the bee keeper, an affidavit stating that prohibited pesticides have not been used for three years would be required.

Sunset review process updated. Sunset Review, the process of reviewing substances on the NOP's National List every five years, is mandated by OFPA. Under the policy, if a substance is not reviewed it would automatically be removed from the list. To remain on the list, it must be shown that the use of such substances – (i) would not be harmful to human health or the environment; (ii) is necessary to the production or handling of the agricultural product because of the unavailability of wholly natural substitute products; and, (iii) is consistent with organic farming and handling. The recommendation strengthens the review process and gives the NOSB the ability to add or change annotations on listed materials to further restrict or clarify allowed uses.

The policy recommendation addresses three areas of attention that are central to a comprehensive sunset review.

1. *Thorough and comprehensive review.* Sunset review must be a rigorous and comprehensive review process that is supported by a technical review document and public input that reevaluates and updates previous findings to ensure that a decision to renew or restrict a currently listed material is fully informed and in compliance with the statutory standards.

2. *Listed materials subject to sunset review.* Allowed materials under §205.601 and §205.603, §205.605, and §205.606 are sunsetted or removed from the National List unless the Board takes affirmative action to retain their uses. Similarly, prohibited uses under sections §205.602 and §205.604 will sunset unless the Board takes action to relist.

3. *Annotations*. The ability to add or change annotations (restrictions) on applicable National List materials may be important to the Board's sunset decision, given changes in the use patterns of allowed materials and scientific understanding. Sunset decisions by the Board are arrived at through a two-step consecutive process that separates the decision on annotations from the final sunset decision. Under this process, first the assigned committee and then the Board reviews the technical review document(s) and public input to determine whether the material continues to comply with the statutory standards. If the committee identifies the need for a use restriction or clarification, it may propose the annotation in the form of an amendment to a motion to renew. The committee and subsequently the Board will first take up the annotation amendment and then vote on the material's renewal. The public will have an opportunity to comment on the proposed final sunset decision. An annotation to expand the use of a substance cannot be done through the sunset review process.

Upcoming NOSB Issues (April 2011 meeting)

The following issues are expected to be voted on by the NOSB at its upcoming meeting, April 26-29, 2011. The NOP will open a 30-day written comment period prior to the meeting. Individuals may also request to make an oral presentation before the Board. Prior

An ADM wet corn mill in Iowa

to the comment period, email NOP Deputy Administrator Miles McEvoy, Miles.McEvoy@ams.usda.gov, but be sure to submit your comments during the 30-day window to be a part of the public record. *More details on each of the following issues is available at www.beyondpesticides.org/organicfood/action.*

What is synthetic: Corn steep liquor and chemical change. The NOSB's upcoming decision on whether corn steep liquor (CSL), a byproduct of the corn wet milling process, is a synthetic substance because of its processing raises a central issue in the implementation of OFPA. CSL is used as an additive in compost and could be used as a fertilizer. While it has been in limited use, a reevaluation of its production process has raised a central question about its status as a natural or synthetic substance. At the Spring 2011 board meeting, the NOSB will vote to determine whether CSL is considered synthetic (and therefore prohibited) or nonsynthetic (allowed, unless prohibited on the National List). (See NOSB's definition of synthetic substances.)

In the past, CSL has been considered nonsynthetic by stakeholders, but was more recently classified as synthetic by the Organic Materials Review Institute (OMRI), using the NOSB's 2005 clarifications regarding the classification of synthetic and nonsynthetic substances. In April 2010, NOP requested that the NOSB review CSL's classification as a synthetic or nonsynthetic input in crop production. That process began at the October 2010 meeting. The NOSB Crops Committee (CC) is asking for additional analysis of relevant issues by the USDA Agricultural Marketing Service (AMS) Science and Technology Program (S&T).

In a nutshell, the question comes down to the addition of the synthetic sulfur dioxide (SO2) in the milling process, most commonly the counter current wet milling process. If SO2 cleaves disulfide bonds making amino acids available for plant uptake, then most scientists believe that chemical change has occurred and CSL is synthetic. If the SO2 merely acts to prevent putrification, and the disulfide bonds are broken naturally by microbial activity during lactic acid fermentation, then CSL would be considered nonsynthetic. Scientists attribute the breaking of the protein matrix of the corn and the changing of its functionality to the steeping of corn in SO2 throughout the wet milling process. Others believe that because it is a food waste product it is perceived to be natural. Based on information provided by S&T, the Crops Committee voted that CSL is synthetic, with a strong minority opinion that it is nonsynthetic. The issue was sent back to the committee at the October 2010 meeting and it voted 4-3 that CSL is nonsynthetic. The NOSB will vote on this at the April 2011 meeting.

Classification of Materials: Significant/Insignificant. In referring to agricultural and processing inputs in its *Classification of Materials* policy (not yet codified by NOP), the NOSB Materials Committee states that, "A material would be classified as synthetic when...the material contains, at a significant level, a synthetic substance..." It is Beyond Pesticides' position that all materials manufactured or processed with synthetic agents, regardless of the function they perform, must be evaluated for significance. The NOSB is now considering a definition of "significant," which may be voted on at the April meeting.

OFPA states that synthetic substances may only be exempted for use if it "would not be harmful to human health or the environment." Like an evaluation for inclusion on the National List, a review under the Classification of Materials must be able to determine harm to health or the environment. Because some chemicals (endocrine disruptors) cause adverse effects at extremely low levels, often following an inverse dose response curve or more closely associated with timing of exposure than dose, significance is not a function of amount. Therefore, any amount would be significant under OFPA. By evaluating all detectable synthetics, NOSB would be able to fulfill its duty to evaluate for harm.

Animal welfare - stocking rates. According to the NOSB, animal welfare is a basic principle of organic production. Its Livestock Committee considers animal welfare an appropriate and effective regulatory issue under the organic standard. Good animal welfare requires that animals are able to perform species specific behaviors and enjoy as natural and normal a life as possible. The NOSB believes that imprecise language in organic regulations has created unintended production practices that could allow the welfare of some animals to be compromised.

The recommendation provides detailed information on indoor and outdoor stocking density by livestock type. Animals raised without enough space are more susceptible to disease and prone to other health issues. Advocates say that factory-style farm practices create an unfair advantage and should be banned in organic agriculture. In September 2010, the Cornucopia Institute released its report *Scrambled Eggs: Separating factory farm egg production from authentic organic agriculture*, highlighting this issue.

Got Bed Bugs? Don't Panic.

Bed bugs do not transmit disease and can be controlled without toxic pesticides

By Stephanie Davio

Few pests evoke as much terror as the bed bug, and a recent resurgence across the U.S. has homeowners and apartment dwellers taking desperate measures to eradicate the tenacious bloodsuckers, with some relying on dangerous pesticides and fly-by-night exterminators. These measures pose more dangers than any perceived short-term benefit.

While there is no magic bullet solution to bed bug eradication, there are many ways in which they can be effectively managed without the use of dangerous chemical pesticides, which most agree are ineffective due to bed bugs' resistance. Bed bugs can be controlled through a comprehensive strategy that incorporates a variety of structural and mechanical methods, monitoring, sanitation and non-chemical and least-toxic treatments. To solve the bed bug problem nationwide, it will take a comprehensive public health campaign —public-service announcements, travel tips and government-sponsored integrated pest management (IPM) programs for public housing and other high density areas.

Facts about Bed Bugs

What are bed bugs?

There are at least 92 bug species in the family *Cimicidae*, some of which are known to feed on humans, bats, birds and other warm-blooded animals. All bed bugs are wingless and feed by hematophagy, or blood feeding. Adults are between 1/8 and 1/4 of an inch, reddish-brown in color and flat and elliptical in shape, appearing somewhat like a flattened apple seed. The bed bug's tiny white eggs that are nearly invisible to the eye at approximately 1mm in length (the size of two grains of salt) and are deposited in batches of 10-50. Immature bed bugs, or nymphs, are smaller than adults (about the size of a pin head) and are yellowish or clear before eating and red or purple afterwards. Bed bugs' antennae are segmented in four pieces, and the insects' bodies are covered in short, golden hairs. Their legs are well-adapted to crawling up vertical surfaces, such as wood, paper, plaster, and with some difficultly, dirty glass. Bed bugs can survive three months to one year on a blood meal.

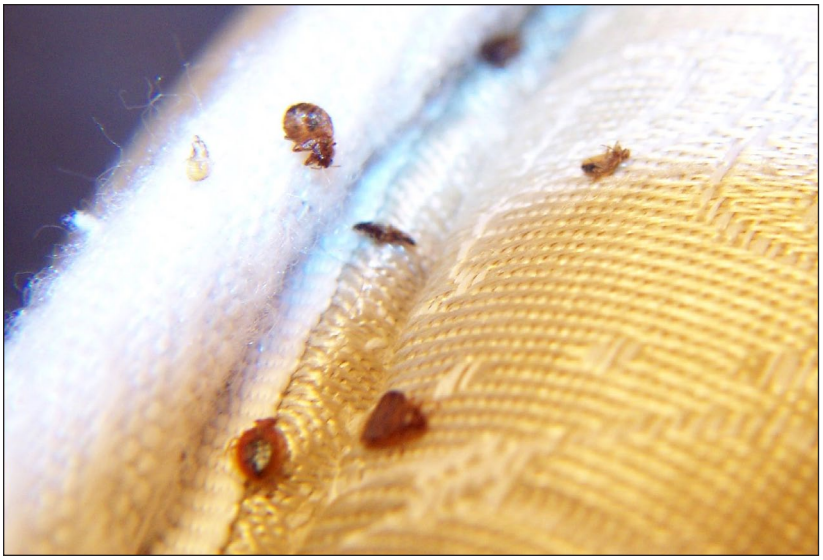
How do bed bugs get into your home?

People can get bed bug infestations in their home by visiting other infested homes or hotels where the vermin hide in mattresses, pillows and curtains. The bugs are stealth hitchhikers that climb onto bags, clothing and luggage. In the case of apartments and/or adjoining homes, bed bugs are able to travel by way of water pipes, wall voids, gutters and wiring. Rodents, birds, and bats can serve as alternative hosts. If nearby habitat is the source of the insect, then it should be carefully moved away from the building and the bed bugs' entryway should be blocked. Otherwise, bed bugs have likely been introduced accidentally or are traveling between homes.

Should I be scared?

There are no documented cases of bed bugs transmitting diseases in humans, and they are not effective vectors of disease. Their medical significance is mainly limited to the itching and inflammation from their bites, which can be addressed with antihistamines and corticosteroids to reduce allergic reactions and antiseptic or antibiotic ointments to prevent infection.

The stigma associated with bed bugs can cause some to panic and spray toxic pesticides, without being educated on the problem. Even registered pesticides are linked to a variety of health effects, and because many of them are sprayed in areas where there is continuous human contact (beds), there is elevated concern for exposure.



Check for bedbugs on the seam of mattresses.

Monitoring

How do you know if you have bed bugs?

Detecting bed bugs may be as easy as realizing you are waking up with sore spots or itchy welts, often in a line. However, identification should not be based solely on the appearance of the bites, since they can resemble bites caused by many other kinds of blood feeding insects, such as mosquitoes and fleas. Find the insects and identify them, either using the description mentioned here or by taking a specimen to an entomologist.

How can you detect bed bugs?

Bed bugs are nocturnal insects. The night is the time to see them active and feeding, mostly in the hours before dawn. To see bed bugs while active, use a red light. If you are unable to see them, look for evidence of bed bugs; carefully check furniture, linens or luggage brought into the house for bed bugs or rusty-orange stains from their fecal matter.

You can also try putting duct tape on bed legs (sticky side out), which may trap insects for identification or use pheromone traps. Dogs can also be trained to find bed bugs. A well-trained dog from a reputable company (see Bed Bug Central[4]) can pinpoint the exact location of the bugs, drastically increasing the efficacy of any bed bug management approach.

It is not a bad idea to hire a professional to inspect your home for bed bugs as well. Long term management relies on frequent monitoring in order to assess the scope of the infestation and determine the necessary actions to implement.

Bed bugs (and their eggs) are most often found in the following places:

- Cracks and crevices of bed frames or headboards; and,
- Along the seams of mattresses, or within box springs.

They may also be found:

- Cracks and crevices of the floor, plaster or ceiling moldings;

Bed Bug Pesticides Are Toxic!

These are the active ingredient chemicals[1] that can be found in products labeled for bed bug control and the health effects[2] that they have been linked to:

- **Bifenthrin -** Moderately Acutely Toxic, Cancer (possible), Endocrine Disruption, Neurotoxicity, Sensitizer/Irritant
- **Chlorfenapyr* -** Moderately Acutely Toxic, Cancer (potential), Kidney/Liver Damage
- **Cyfluthrin* -** Moderately Acutely Toxic, Reproductive Effects, Neurotoxicity, Kidney/Liver Damage, Sensitizer/Irritant
- **Deltamethrin* -** Moderately Acutely Toxic, Endocrine Disruption, Neurotoxicity, Sensitizer/Irritant
- **D-Phenothrin* -** Slightly Acutely Toxic, Neurotoxicity, Kidney/Liver Damage
- **Fenvalerate -** Slightly Acutely Toxic, Endocrine Disruption, Neurotoxicity, Kidney/Liver Damage, Sensitizer/Irritant
- **Hydroprene -** Slightly Acutely Toxic, Sensitizer/Irritant
- **Lamda Cyhalothrin -** Moderately Acutely Toxic, Endocrine Disruption, Neurotoxicity, Sensitizer/Irritant
- **Pyrethrins* -** Slightly Acutely Toxic, Cancer (likely), Sensitizer/Irritant
- **Permethrin* -** Moderately Acutely Toxic, Cancer (possible), Endocrine Disruption, Reproductive Effects, Neurotoxicity, Kidney/Liver Damage, Sensitizer/Irritant
- **Propoxur -** [This pesticide is not registered by EPA for bed bug control, however, it has been used illegally and some pest companies and states are attempting to get EPA to allow it.[3]] Highly Toxic, Cancer (probable), Reproductive Effects, Neurotoxicity, Kidney/Liver Damage

***** *These pesticides can be found in products that include uses for mattresses on the label.*

What to Do in Rented Property and Multi-Unit Dwellings

All of the information in this fact sheet can be used to help prevent and stop the spread of bed bugs in your home, but what do you do if you live in or manage an apartment building with many different units?

1. Notify. The very first step that you should take if you have a bedbug infestation in your apartment is to notify your landlord. The landlord should then notify other tenants that bedbugs have been found in the building and provide clear information as to what to do. If you are a landlord, it is a good idea to send information out to your tenants before there is a problem in order to prevent a future infestation.

2. Decide a Plan of Action. If you are renting, look to your lease to see who is responsible for managing pests in your home, and discuss options with your landlord. Tenants might be responsible for paying for pest control; however, if there are structural problems that allow bed bugs to get in, or if more than one unit in a building has bed bugs, the landlord should take responsibility. Talk to your landlord and neighbors about the benefits of non-chemical control methods for managing bed bugs.

3. Follow directions. To manage bed bugs, it is essential to follow all prevention steps like minimizing clutter, laundering clothing, sealing cracks and crevices, isolating and encasing items, and vacuuming; followed by heat treatment, steam cleaning, and as a last resort, least-toxic chemicals.

4. Cooperation. It takes the entire community's effort to deal with this problem. Landlords should work with those who are unable to take the steps alone and need to deal with those who are unwilling to cooperate. This step is crucial for bedbug control in multi-unit housing. If one person in a building refuses to cooperate in controlling and preventing bed bugs, it is much more difficult to manage these blood-sucking pests.

- Along the edge of carpeting;
- Under loose wallpaper; behind picture frames, wall hangings, switch plates and outlets;
- In drapery pleats, the upholstery of sofas or chairs or the folds of clothes hanging in the closet;
- In the cracks and crevices of night stands or bureaus;
- Inside clocks, phones, televisions and smoke detectors; and,
- In more established infestations, bed bugs move further from the bed.

Prevent and Control

I HAVE BED BUGS! What do I do?

Before attempting any other control methods and especially before considering using a chemical control, do the following:

Eliminate Clutter

Clutter creates areas for the bed bugs to hide, making eradicating them extremely difficult. When efforts to control bed bugs fail, it is almost always due to clutter and lack of cooperation with key prevention and follow-up instructions.

Items that are badly infested may be discarded; however, with the many management options available, it is not necessary. If you do decide to get rid of something from your home, it's imperative that it gets disposed of properly. Infested furniture (especially mattresses) haphazardly placed on the curb will only help spread the bed bugs into other people's homes. Be sure to place a warning sign on any discarded furniture to discourage others from picking it up. Additionally, bagging or wrapping the items can help prevent the bugs from spreading while they are en route to your garbage facility.

Installing ProtectaBed bedbug proof mattress encasement. *Photo by David P. James, www.flickr.com/photos/voltrader.*

In addition to clutter inside your home, it is important to eliminate clutter outside too! Remove any animal habitats near, attached to, or inside the house, such as bat roosts or bird nests in the eaves, roof or attic, and exclude animals from entry. Deal with any rodent infestations using least-toxic management strategies (see Beyond Pesticides Alternatives Factsheets - www.beyondpesticides.org/alternatives/factsheets). Move woodpiles and debris away from the structure, and eliminate all garbage.

Encasements and Isolating Items

Isolating and encasing furniture is important and prevents items from becoming infested. This will kill bed bugs only if insects have no chance for escape and if they are enclosed for long enough to starve to death. Recommendations based on old research suggests that bed bugs can live over a year without a meal, however, in a 2010 study by Andrea Polanco from the Miller Lab at Virginia Tech finds that bed bugs die within three months.[5]

Mattress and box spring encasements are costly at over $50, however if you are considering the alternative of throwing out your mattress and getting a new one, this price pales in comparison. Encasements eliminate hiding spots for the bed bugs, which make early detection of an infestation easier. They will also trap any bed bugs that are hiding inside of the mattress if an infestation has already developed, and if left on for over a year, will effectively kill those trapped. Bed Bug Central[6] has a great guide on buying mattress encasements.

Laundering Fabrics and Clothing

This is one of the best control methods from both a practical and efficacy standard. The heat in a clothing dryer is extremely effective at killing both bed bugs and the eggs; however, it is important to note that the same container used to transport infected clothing and fabric should not be used to hold the freshly laundered clothing. You can use either dissolvable (GreenClean™ dissolvable laundry bags) or washable bags to transport clothes to the laundry room or facility. Wash and dry clothing for a full cycle on the hottest settings that the fabric will allow; once clothes are finished, place the clean clothing in a sealed bag to prevent re-infestation and keep non-essential items in the sealed bags for as long as practical or at least during the treatment period.

For dry clean only clothing, or clothing that is already 'clean' but may be infested, simply put clothing in the dryer only and either run it for 30 minutes on the hottest setting, for a full cycle on a lower heat setting if the fabric will be damaged at the highest heat.

Vacuuming

Thorough vacuuming will get rid of any visible bed bugs along with any dirt that provides them shelter, helping to reduce populations. Make sure that the vacuum has a removable bag and seal and discard it after using. Additionally, it's best to choose a vacuum attachment that does not have bristles or brushes.

Carefully vacuum rugs, floors, upholstered furniture, under beds, around bed legs, bed frames, and all cracks and crevices in the room. Scrubbing infested surfaces with a stiff brush will help dislodge eggs and using a powerful vacuum will help remove them from cracks and corners.

Caulk and Seal Crevices

Fill cracks, crevices, nooks or crannies in bed frame, floors, walls, edge of baseboards and moldings with sealant. Re-glue loose wallpaper. Fix screens, to prevent bed bug entrance from the outdoors.

Tips for Traveling

Bed bugs are professional hitchhikers. Don't let this fact get in the way of your travel plans, however; with a little bit of extra vigilance, you can avoid stowing these infamous pests by following a few simple steps:

- Check bed for signs of bedbugs in your hotel room – look at the mattress seams, in the cracks and corners of the bed including the headboard.
- Do not put luggage on the bed, couch or carpeted floor. Instead, take advantage of the raised suitcase stand, or if that's not available, place your suitcase in the center of a non-carpeted floor (you can put the suitcase in the bathtub while checking the room).
- Contain items that may harbor bedbugs, like your laundry, until you can launder, heat treat or freeze them. Separate and contain these items before you get home so the bedbugs do not escape into your house.
- When you get home, closely inspect your suitcase and other items for any signs of bedbugs. If you see signs of bed bugs, place items in a plastic bag until you can follow the directions for vacuuming, steam cleaning, heat treatment or freezing.

The following options work best after the above steps options are taken:

Steam Treatments

Steam treatments, when properly applied, will kill all stages of bed bugs. Proper application includes using low moisture or "dry" steam from a commercial unit with a floor and upholstery attachment, moving the nozzle over the bed bugs at a rate of 20 seconds per linear foot. If it is applied with too much pressure, the bed bugs will be blown away. In order to diffuse the pressure an upholstery nozzle can be wrapped in a piece of fabric.

It's important to note that many, if not most, pest management companies have steam units available. Due to the length of time it takes to apply, however, they might not routinely use it. If you hire a company, be sure to ask them if they have this equipment available and request that they use this for treatment!

Pest Masters of Ft. Meyers, FL is one of many companies that recognize heat treatments are an effective tool in controlling bed bugs.

Heat Treatments

Depending on the quality of the preparation and treatment, using ambient heat can either provide complete control or significantly reduce bed bug population and infestation. A pest control company can use fans and a heat source, a space is heated to 130°F to 140°F and held until all areas within the space are heated to 120°F.[8] A whole room can be heated, or a few items in a smaller, insulated area can be heated. It is not advisable for homeowners to do this task themselves, as there is the potential for causing a fire or serious burns.

Opening drawers and peeling carpet away from baseboards can help this process. This method will work best after clutter has been eliminated, thorough vacuuming has taken place, and clothing/fabrics have been laundered and enclosed in a sealed plastic bag. However, in some cases where these steps are not possible, heat treatments may be still be performed effectively to reduce bed bug populations. These circumstances include cases where tenants or homeowners are physically unable to take the above steps.

Least-Toxic Chemical Options (Last Resort)

Open wall voids and treat with sodium borate or food-grade diatomaceous earth. Wear a dust mask when handling powder formulations. Seal void completely. Clean vacuumed areas (see above) with diluted sodium borate (2 oz per quart of water). If you hire a professional, insist on heat treatment. Spraying for bedbugs is hazardous and generally ineffective due to resistance.[9] Read about the health and environmental effects of pesticide ingredients on the Pesticide Gateway, www.beyondpesticides.org/gateway.

Katie Khoury also contributed to this article.

Citations

[1] Techletter, 2010. Insecticides for Bed Bug Control. Pinto and Associates. www.techletter.com/Archive/Technical%20Articles/bedbuginsecticides.html.
[2] Beyond Pesticides, 2010. Gateway on Pesticide Hazards and Safe Pest Management. http://www.beyondpesticides.org/gateway/index.htm.
[3] Beyond Pesticides, 2010. Under Pressure EPA Denies Ohio's Request to Use Restricted Pesticide, Beyond Pesticides Daily News Blog. http://www.beyondpesticides.org/dailynewsblog/?p=3719.
[4] Green, P., 2010. A New Breed of Guard Dog Attacks Bedbugs. New York Times. http://www.nytimes.com/2010/03/11/garden/11bedbug.html.
[5] National Center for Healthy Housing, 2010. What's Working for Bed Bug Control in Multifamily Housing, citing Polanco-Pinzón, Andrea, Virginia Technical University.http://www.nchh.org/Portals/0/Contents/bedbug_report.pdf.
[6] Bed Bug Central, 2010. Bedbugs 101 Mattress and Box Spring Encasements. http://www.bedbugcentral.com/bedbugs101/topic.cfm/mattress-and-box-spring-encasements.
[7] National Center for Healthy Housing, 2010. What's Working for Bed Bug Control in Multifamily Housing. http://www.nchh.org/Portals/0/Contents/bedbug_report.pdf.
[8] Tvedten, S. The Best Control for Bed Bugs, The Best Control II. http://www.stephentvedten.com/18_Bed_Bugs.pdf.
[9] Bai, Xiaodong, et al. Transcriptomics of the Bed Bug (Cimex lectularius). PLoS ONE 6(1): e16336.

Bed Bug Policy

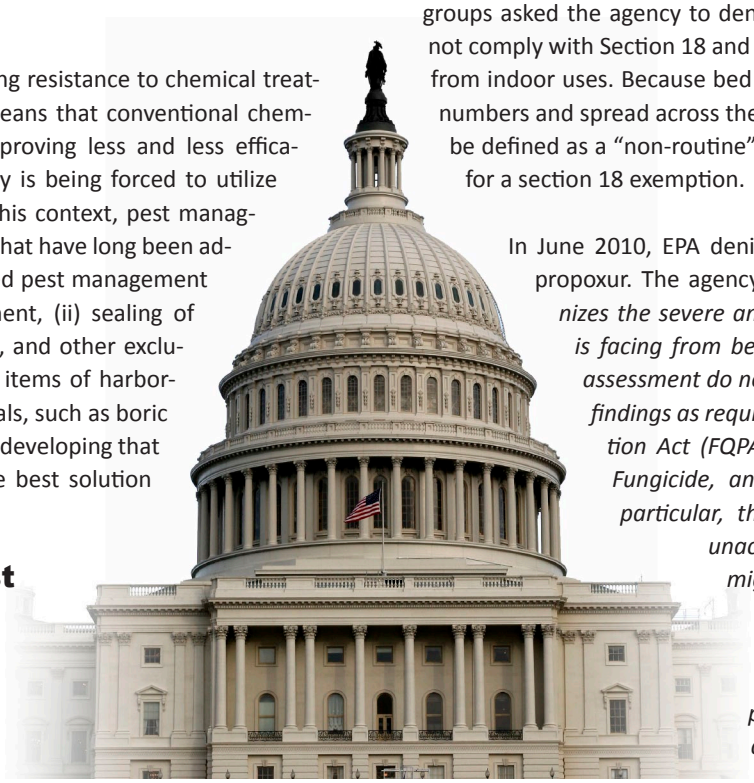
Regulatory Decisions, Congressional Intervention and the Rise of Bed Bugs

By Nichelle Harriott

Bed bugs, having rebounded in significant numbers, are reported in every state in the U.S. In November 2010, U.S. Representatives G.K. Butterfield (D-NC) and Don Young (R-AK) sponsored a Congressional Bed Bug Forum to solicit recommendations from professionals, researchers and other stakeholders, including federal agencies, to strengthen proposed legislation aimed at providing additional resources to prevent and manage bed bug infestation at lodging facilities and public housing. This new bill, *Don't Let the Bed Bugs Bite Act* (H.R. 2248) is set to be reintroduced in the new Congress.

Federal interest in the bed bug epidemic officially began when EPA convened the first ever *National Bed Bug Summit* in April 2009 to hear from scientists, state and local officials, pest control operators and the general public on how to tackle the resurgence of the blood sucking insects. From this meeting, stakeholders submitted recommendations to the agency for combating the bedbug resurgence, some of which included: (1) formulating and mandating integrated pest management (IPM) strategies and certification for bed bug control, (2) creating tracking systems/clearinghouse for data, (3) regulations for addressing recycled/refurbished mattresses and dealing with infested items, (4) increasing consumer education and the use of public service announcements on TV, web, radio, billboard, hotlines, and (5) standardization of pest control operator training.

Given that bed bugs are showing resistance to chemical treatments (see page 20), which means that conventional chemical-intensive approaches are proving less and less efficacious, the pest control industry is being forced to utilize non-chemical alternatives. In this context, pest managers are employing approaches that have long been advocated as integral to integrated pest management (IPM), such as (i) heat treatment, (ii) sealing of cracks and crevices, entryways, and other exclusion techniques, (iii) removing items of harborage, and (iv) least-toxic chemicals, such as boric acid. Widespread agreement is developing that non-chemical practices are the best solution for beg bug control.



Emergency Request For Propoxur

In the fall of 2009, the Ohio Department of Agriculture requested EPA to allow the indoor residential uses of propoxur (banned for use around children) under the emergency exemption provision (Section 18) of the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA) for use in the fight against bed bugs. According to FIFRA, an emergency condition is defined as "an urgent, non-routine situation…" Section 18 of FIFRA authorizes the agency to allow a new use of a registered pesticide or the use of a pesticide whose registration is pending (and making progress toward registration) for a limited time if the agency determines that an emergency condition exists. EPA must perform a multi-disciplinary evaluation of the request, including human, occupational and environmental risks. The law also states that the agency must deny an exemption request if the pesticide does not meet safety standards, or if emergency criteria are not met. The exemption should not encourage nor allow the use of pesticides that have been cancelled or voluntarily withdrawn. A major concern with Section 18 exemptions is the effect that exempt chemical uses will have on aggregate pesticide exposures. These uses go unevaluated and are not part of the risk assessment process. Without strict adherence to Section 18 criteria, allowance of unregistered, cancelled, or withdrawn pesticide uses and unregistered pesticides risks a public health problem.

Beyond Pesticides and 13 other environmental and public health groups asked the agency to deny this request because it does not comply with Section 18 and presents unacceptable hazards from indoor uses. Because bed bugs have rapidly increased in numbers and spread across the country, they certainly cannot be defined as a "non-routine" situation and does not qualify for a section 18 exemption.

In June 2010, EPA denied the section 18 request for propoxur. The agency stated, *"Although EPA recognizes the severe and urgent challenges that Ohio is facing from bed bugs, the results of the risk assessment do not support the necessary safety findings as required by the Food Quality Protection Act (FQPA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In particular, the requested use presents an unacceptable risk to children who might be exposed to propoxur in and around rooms treated for bed bugs. EPA is required to make a safety finding in support of newly requested pesticide uses, including those that*

The Role of Government Agencies in Addressing the Bed Bug Epidemic

- **Environmental Protection Agency:** EPA is working to ensure that pest management professionals and the public have access to the latest information on effective bed bug control tools. EPA is also working to educate the general public, pest professionals, and public health officials about bed bug biology and IPM, which is critical to long-term control. www.epa.gov/pesticides/bedbugs.

- **Centers for Disease Control and Prevention:** CDC is partnering with experts in the areas of medicine, entomology, epidemiology and environmental toxicology to better understand the resurgence of bed bugs and the methods and tools that are needed for effective control. www.cdc.gov/nceh/ehs/Topics/bedbugs.htm

- **U.S. Department of Agriculture:** USDA Agricultural Research Service is researching new and existing chemical methods for controlling bedbugs, studying their behavior and life cycle.

- **Department of Housing and Urban Development:** HUD is funding research on bed bug monitoring and control in low-income, multi-family housing, along with educating public housing authorities and other housing industry groups about bed bug identification and control. www.hud.gov/offices/pih/programs/ph/phecc/pestmang.cfm

- **Local Health Departments:** Health departments serve on the front lines, providing information on prevention and control of bed bugs through various programs to the public and private sector.

are sought on an emergency basis, such as this use of propoxur on bed bugs. Propoxur, along with other members of its chemical class [carbamate], is known to cause nervous system effects. The Agency's health review for its use on bed bugs suggests that children entering and using rooms that have been treated may be at risk of experiencing nervous system effects. The specific exposure scenarios that are of most concern involve inhalation risk and also hand-to-mouth behaviors on the part of children."

To date, EPA, the Centers for Disease Control and Prevention (CDC), states, and other stakeholders including pest control operators, local health departments, the U.S. Department of Housing and Urban Development (HUD), and academia are facilitating communications and working to expand the knowledge base among agencies and programs that may have a role in reducing bed bug populations.

There are currently no indoor residential (crack and crevice) spray uses for propoxur. It is evident based on independent data (see ChemWatch factsheet) that propoxur use, in the form of liquid/sprays, poses significant exposure risks. In 2007, before the completion of the cumulative risk assessment of N-methyl carbamates, the registrant voluntarily cancelled propoxur indoor spray uses for cracks and crevices, which may result in non-occupational exposure for children. The remaining indoor uses include bait traps, pastes, and impregnated shelf paper.

Prior to 2007, EPA had issued a *Reregistration Eligibility Decision* (RED) for propoxur in 1997 which re-authorized certain uses of propoxur after Bayer AG voluntary cancelled and amended labels deleting use of ready-to-use liquids with trigger pump sprayers. This "eliminated those uses posing the greatest concern" (i.e. flea dips and shampoos for pets, and total-release fogger products), and came after several internal agency decisions. In 1988, EPA considered initiating a Special Review for propoxur in light of potential carcinogenic risks to pest control operators and the general public. In 1989, Bayer AG decided not to support the outdoor uses of propoxur on ornamentals, on lawns/turf, and for mosquito control- uses which posed significant exposure risks. The end-use manufacturers followed suit, and these uses were removed from the label. As a result, after evaluating the exposure and carcinogenicity data in 1995, the agency decided not to perform the review. The remaining outdoor uses of propoxur include residential uses around home foundations, sidewalks, patios, and driveways, spot treatments to wasp nests and ant hills, insecticidal tape on boat mooring lines and in gypsy moth and medfly traps.

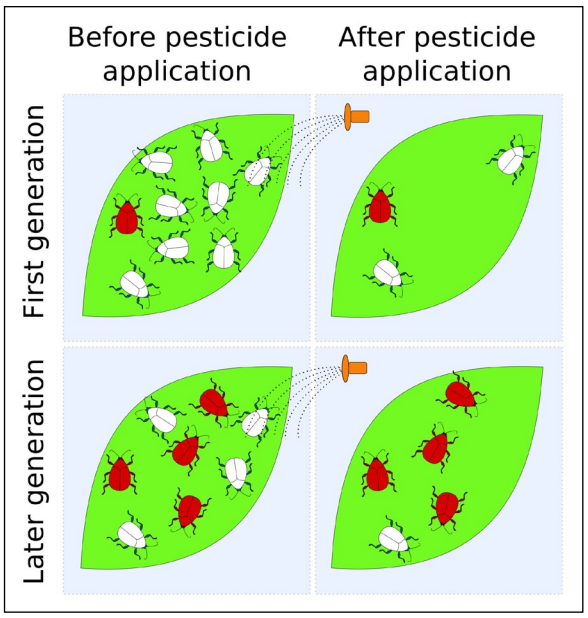
In November 2007, the Natural Resources Defense Council (NRDC) submitted a petition to EPA to cancel the pet collar uses of propoxur and supplemented that petition on April 2009. EPA responded that it was evaluating the information regarding pet collar exposures and intends to respond to the petition. The agency also asserted that it recognizes that the registration review process is not a substitute for the agency's consideration of NRDC's petition to cancel propoxur pet collar uses. EPA anticipates responding to the petition prior to the completion of registration review.

EPA began another registration review of propoxur in 2009 that is slated to completed in 2015. For more information on propoxur, see the *Pesticide Gateway*, www.beyondpesticides.org/gateway.

Pesticide Resistance

Pesticide resistance, the ability of an organism to withstand a poison, is a predictable consequence of repeated pesticide use. The Insect Resistance Action Committee, a pesticide industry working group, defines resistance as "a heritable change in the sensitivity of a pest population that is reflected in the repeated failure of a product to achieve the expected level of control when used according to the label recommendation for that pest species." Resistant organisms are simply following the rules of evolution; the best-adapted individuals survive and pass their resistance on to their offspring.

In many cases, pesticide resistance has resulted in more frequent spraying as farmers and residential pest control operators scramble to destroy the resilient organisms, followed by increasing resistance and escalating crop losses. This cycle is often called the pesticide treadmill as users spray more with increasingly potent chemicals and still lose ground.



Resistance on the Rise

Pesticide resistance is increasing in occurrence. In the 1940s, farmers in the U.S. lost seven percent of their crops to pests, while since the 1980s, the percentage lost has increased to 13 percent, even though more pesticides are being used. According to Michigan State University Extension, over 500 species of insects have developed a resistance to a pesticide. Others estimate it is even higher.

Genetically engineered (GE) crops have been responsible for an increase of 383 million pounds of herbicide use in the U.S. over the first 13 years of commercial use. The primary cause of the increase is the emergence of herbicide-resistant weeds. As a result, biotech companies are now working on crops resistant to more potent herbicides.

Development of Resistance

Organisms can develop resistance by: 1) developing a means of detoxifying the pesticide; 2) altering the target site (part of the body's metabolism affected by the pesticide) to reduce its sensitivity or the pesticide's ability to bind; or 3) decreasing pesticide penetration.

A single resistance mechanism can convey resistance to two or more pesticides that have similar modes of action, called cross-resistance. While multiple resistance is the ability to cope with pesticides of different modes of action.

How quickly pesticide resistance develops depends on: the frequency of use, the mechanisms of resistance, the genetics of the resistance mechanism, the size of the gene pool and how quickly the organisms reproduce. For example, plants have been slower to develop resistance because they have only a few generations each year and a large bank of unexposed plants in the form of seeds in the soil.

Bed Bugs: Why they are not going away

The U.S. has been relatively bed bug free for the past 60 years. In the 1940's bed bugs were controlled with toxic chemicals such as DDT. Since then, newer classes of insecticides like synthetic pyrethroids have been employed to keep bed bug populations down. Meanwhile, bed bugs have slowly been developing resistance mechanisms and have become resistant to most, if not all, insecticides on the market. On average, insecticides labeled for bed bug control can take over 150 hours to kill a bed bug, compared to seconds or minutes in previous years. An Ohio State study, "Transcriptomics of the Bed Bug," published January 2011 in the journal *PLoS One* confirms bed bug resistance to pyrethroid insecticides and highlights the need to adopt non-chemical methods for controlling bed bugs and other insect pests. According to researchers, bed bugs have developed multiple mechanisms to evade chemical attack.

- **Reduced cuticular penetration:** for some bed bugs, insecticides are unable to penetrate the exoskeleton (cuticle), thereby rendering the pest insusceptible to chemical attack.
- **Enhanced enzymatic activity:** if the insecticide is able to penetrate the cuticle, some resistant bugs can quickly detoxify the chemical agent and eliminate it from their bodies due to heighted enzymatic action.
- **Target site insensitivity:** mutations at the target site for the chemical render the pests unaffected by the insecticide.

ChemicalWatch Factsheet

PROPOXUR

Despite its known toxic hazards to children, resulting in its cancellation for indoor residential uses in 2007, the insecticide propoxur (2-isopropoxyphenyl methylcarbamate) has emerged as the chemical that exterminators want to use in the war on bedbugs. To allow this to happen, the U.S. Environmental Protection Agency (EPA) would have to change its regulatory restrictions. Many states are calling on EPA to do just that.

Known by the trade name Baygon™ and found in numerous registered products, propoxur (2-isopropoxyphenyl methylcarbamate) was first registered as an insecticide by Bayer AG in 1963. It is used to control ticks, fleas, and a variety of insects including crickets, ants, wasps, cockroaches and silverfish. It is an N-methyl residual carbamate insecticide, a family of toxic chemicals that includes carbaryl, aldicarb and carbofuran. Propoxur currently has registered uses for in-and-around industrial, commercial (including food handling establishments and food processing plants), and residential facilities.[1] Indoor residential uses of sprays for cracks and crevices were voluntarily cancelled in 2007, but formulations such as bait traps, pastes, and impregnated shelf paper are still registered for residential use. The primary outdoor uses are structural perimeter bait applications, as well as liquid and aerosol spot treatments. There are no agricultural uses.

ChemicalWatch Stats

Chemical Class: Carbamate insecticide

Use: Control of ants, roaches and hornets indoors (institutional, industrial, commercial buildings) and limited outdoor applications

Prohibition: Residential uses that expose children

Toxicity rating: Highly toxic

Signal Word: Caution, Warning, or Danger

Health Effects: Probable human carcinogen (Group B2), Cholinesterase inhibitor

Environmental Effects: Toxic to bees, fish and other aquatic organisms, birds and mammals

Mode of Action

As a member of the neurotoxic N-methyl carbamate family of chemicals, propoxur shares a common mechanism of toxicity with other chemicals in this class. This means that hazards associated with multiple exposures to carbamate pesticides are cumulative. Carbamates share structural characteristics and an ability to inhibit acetylcholinesterase (AChE), an enzyme important for the transmission of nerve impulses. When AChE is inhibited, acetylcholine accumulates and cholinergic toxicity results due to continuous stimulation of cholinergic receptors throughout the central and peripheral nervous systems, leading to overstimulation of neurotransmitters.[2]

While EPA and much of the scientific literature suggest that those exposed to carbamates who experience cholinesterase inhibition typically recover rapidly (minutes to hours), there is considerable information that links exposure of this sort to long-term neurological damage. In insects paralysis occurs eventually leading to death.

Acute Toxicity

According to EPA's acute toxicity classification, propoxur is moderately toxic (Toxicity Category II) for oral exposure and slightly toxic (Toxicity Category III) via the dermal and inhalation routes of exposure. Propoxur and other carbamates are easily absorbed through breathing, eating or skin contact. Malaise, muscle weakness, dizziness, and sweating are commonly reported early symptoms of poisoning. Headache, nausea, and diarrhea are often prominent. In rare cases, death may result from respiratory system failure. The potential for acute irritant effects to the skin and eyes is low. It is not considered to be a skin sensitizer. In rats, propoxur poisoning resulted in brain pattern and learning ability changes at lower concentrations than those which caused cholinesterase-inhibition and/or organ weight changes.[3]

Propoxur is reportedly less toxic when absorbed through the skin, than when it is ingested. Acute animal tests in rats, mice, and guinea pigs demonstrate propoxur to have high acute toxicity by inhalation exposure and high to extreme acute toxicity by ingestion.[4]

Chronic Toxicity

Chronic inhalation exposure has resulted in depressed

cholinesterase levels, headaches, vomiting, and nausea in humans. Ingestion studies in animals have reported depressed cholinesterase levels, depressed body weight, effects to the liver and bladder, and slight increase in neuropathy.[5]

Carcinogenicity

Propoxur is classified as a B2 probable human carcinogen for which the carcinogenic potential has been quantified at 3.7 x 10^{-3} based on male rat bladder tumors. Tumors in bladders are observed in rats but not in other species.[6] The state of California lists propoxur as a known human carcinogen.[7] Research from the National Cancer Institute shows that propoxur might increase the risk of developing non-Hodgkin's lymphoma (NHL).[8] Propoxur has also been identified as being highly correlated with leukemia in successive generations.[9,10] Other studies indicate that propoxur could act through some epigenetic mechanisms, such as tumor promotion or cell proliferation.[11]

Endocrine Disruption

A study from Tulane University found that propoxur and other carbamates weakly activated estrogen- or progesterone-responsive reporter genes in breast and endometrial cancer cells, and decreased estradiol- or progesterone-induced reporter gene activity in the breast and endometrial cancer cells.[12]

Reproductive and Developmental Toxicity

In reproductive studies, rats fed propoxur have a reduced mean number of fetal implantation sites and a reduced mean number of pups. The developmental data for propoxur indicate that there is no evidence of an increased sensitivity to propoxur from pre- or post-natal exposures. In the rat developmental toxicity study, no developmental effects were noted at the highest dose tested at which significant maternal effects were noted. However, in a rabbit study, developmental toxicity was noted at the highest dose tested with animals exhibiting a slight increase in post implantation loss with corresponding reductions in mean fetuses per dam in the presence of significant maternal toxicity, including mortality, dyspnea, restlessness and slight decreases in mean food consumption and mean body weight.[13]

Occupational Exposure

Occupational exposure to propoxur may occur through inhalation and dermal contact with this compound at workplaces where propoxur is produced or used. Signs of intoxication among spray workers and residents include lethargy, sweating, nausea, and headache; among those applicators with gross dermal and inhalation exposures, tachycardia, emesis, and vertigo ensued. Workers recovered within 30 minutes of cessation of operations and after washing the compound from their skin.[14] According to EPA, workers handling propoxur (e.g., pest control operators) should wear long-sleeved shirts, long pants, chemical resistant gloves, shoes, and socks.[15]

Pets

Propoxur is formulated as impregnated pet collars. As a result, residential dermal exposure and non-dietary ingestion are of concern for individuals, especially children, coming into contact with (hugging, petting) treated pets. Residues of propoxur are expected on pet skin and fur, which pose exposure risks via the oral and dermal routes, especially for young children who have high incidences of hand-to-mouth activity. Pet collars continuously expose pet owners to propoxur residues since these products are designed to continually emit residues throughout their active period. Pet collars can contaminate indoor air as propoxur volatilizes from pets. EPA is currently considering a petition to ban propoxur-based pet collars.

Indoor Residential Data and Exposures

The main route of exposure to propoxur is through the dermal and inhalation route. Propoxur is detected and persists in indoor air[16] and dust.[17] On surfaces, pesticide residues can persist for 60 hours or longer.[18] One study found that airborne concentrations are still detectable 33.5 hours after spraying propoxur indoors.[19] Another determined that the volatilization of propoxur from treated surfaces increases with humidity, resulting in higher air concentrations.[20] In a study investigating indoor-air insecticide levels in inner-city residences, propoxur is found in over 90% of indoor air samples of homes with pregnant women.[21] Inhalation studies have found that propoxur exposure effects a depression of plasma by 20 to 30 percent and erythrocyte and brain cholinesterase activities.[22] Dermal absorption studies,[23] which have shown that propoxur is absorbed through the skin, also find that skin moisture (affected by high temperatures and humidity) influences the dermal uptake of propoxur.[24] A dermal LD50 study with laboratory rats found that on the day of propoxur application to the skin, muscular fasciculations suggestive of cholinesterase inhibition were observed along with decreased motor activity.[25]

Various monitoring studies have confirmed that indoor residential pesticide applications increase the exposure and health risks of residents, especially infants. Indoor residues of pesticides have been detected in carpets, hard surfaces, walls and dust. In a study with inner city underserved mothers and newborns, propoxur levels were significantly higher in the personal air of women reporting use of an exterminator, can sprays, and/or pest bombs during pregnancy, compared with women reporting no pesticide use or use of lower toxicity methods.[26]

Metabolites

Propoxur breaks down relatively quickly in mammalian systems

as well as the environment. Metabolism studies indicate a number of urinary metabolites (such as O-isopropoxyphenyl and 2-hydrophenyl methylcarbamate) are rapidly excreted after exposure to propoxur. In a rat metabolism study, 85% of radioactively labeled propoxur was eliminated in 16 hours, 25-35% as the volatile compounds CO2 and acetone, and 50% in urine as conjugates.

Ecological Effects and Environmental Fate

In the environment, propoxur is subject to degradation via hydrolysis and microbial action. If released to air, a vapor pressure of $9.68X10^{-6}$ mmHg (millimeters of mercury) at 20 deg C indicates propoxur will exist in both the vapor and particulate phases in the ambient atmosphere. The half-life in air is approximately 12 hours. Hydrolysis is both pH and temperature dependent. Under acidic conditions, propoxur is relatively stable. At neutral pH (7), half-life is 30 days at 30°C, and drops to 23 hours at 50°C. Although propoxur is subject to rapid leaching and may be expected to move laterally through runoff, except under acid conditions, residues would be subject to hydrolysis. Bacterial degradation of propoxur is the same under aerobic or anaerobic soil conditions, with half-lives ranging from 80 to 210 days (depending upon soil type). Degradation products in soil and water are O-isopropoxyphenol, CO2, and methyl amine, all of which volatilize into the atmosphere or enter the metabolic pools of plants and microflora. A non-specific poison, propoxur is highly toxic to non-target, beneficial species, such as bees, and is of very high toxicity to crustaceans, fish, aquatic insects, and aquatic worms.

Citations

[1] USEPA. 2010. Propoxur Final Work Plan for Registration Review. Office of Pesticide Programs. Docket number EPA-HQ-OPP- 2009-0806.

[2] USEPA. 2007. Revised N-Methyl Carbamate Cumulative Risk Assessment. Office of Pesticide Programs. Washington DC.

[3] EXTOXNET. 1993, 1996. Pesticide Information Profile- Propoxur.

[4] USEPA. 2000. Propoxur (Baygon) Hazard Summary. Available at http://www.epa.gov/ttn/atw/hlthef/propoxur.htm.

[5] USEPA. 2000.

[6] Cohen, S et al. 1998. Mitogenic effects of propoxur on male rat bladder urothelium. Carcinogenesis 15 (11): 2593-2597.

[7] OEHHA. Proposition 65 List of Chemicals. CA Environmental Protection Agency. Available at http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html.

[8] Colt, J. et al. 2005. Residential insecticide use and risk of non-Hodgkin lymphoma (NHL). Proc Amer Assoc Cancer Res, Volume 46.

[9] Birnbaum, L.S, and Fenton, S. E. 2003. Cancer and Developmental Exposure to Endocrine Disruptors. Environ Health Perspect 111:389–394.

[10] Zahm, S. H. and Ward, M.H. 1998. Pesticides and Childhood Cancer. Environ Health Perspect 106(Suppl 3):893-908.

[11] Wang, T.C. et al. 2009. Multiple factors conferring high radioresistance in insect Sf9 cells. Mutagenesis 24(3): 259-269.

[12] Klotz, D.M. et al. 1997. Inhibition of 17 beta-estradiol and progesterone activity in human breast and endometrial cancer cells by carbamate insecticides. Life Sciences: 60(17):1467-1475.

[13] USEPA. 1997. Reregistration Eligibility Decision (RED) Document. Office of Prevention, Pesticides and Toxic Substances. Washington DC.

[14] Hazardous Substances Database. Propoxur. http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~Qwj05W:1.

[15] USEPA. 2010.

[16] Esteve-Turrillas FA, et al. 2009. Use of semipermeable membrane devices for monitoring pesticides in indoor air. J AOAC Int. 92(5):1557-65; Leva P et al. 2009. Evaluation of the fate of the active ingredients of insecticide sprays used indoors. J Environ Sci Health B. 44(1):51-7.

[17] Colt JS et al. 2004. Comparison of pesticide levels in carpet dust and self-reported pest treatment practices in four US sites. J Expo Anal Environ Epidemiol. 14(1):74-83.

[18] Class, TJ and Kintrup, J. 1991. Pyrethroids as household insecticides: analysis, indoor exposure and persistence. Fresenius' Journal of Analytical Chemistry. 340:446-453.

[19] Kuo HW and Lee HM. 1999. Volatility of propoxur from different surface materials commonly found in homes. Chemosphere. 38(11):2695-705.

[20] Miller, C. W. and Shafik, T. M. 1974. Concentrations of propoxur in air following repeated indoor applications. Bull World Health Organ. 51(1): 41–44.

[21] Whyatt, RM et al. 2007. Within- and between-home variability in indoor-air insecticide levels during pregnancy among an inner-city cohort from New York City. Environ Health Perspect. 115(3):383-9.

[22] Kimmerle G and Iyatomi, A. 1976. Toxicity of propoxur to rats by subacute inhalation. Sangyo Igaku. 18(4):375-82; Pauluhn J, Machemer L and Kimmerle G. 1987. Effects of inhaled cholinesterase inhibitors on bronchial tonus and on plasma and erythrocyte acetylcholine esterase activity in rats. Toxicology.46(2):177-90.

[23] van de Sandt, J. et al. 2000. Comparative in Vitro–in Vivo Percutaneous Absorption of the Pesticide Propoxur. Toxicological Sciences. 58:15-22; Brouwer, R. et al. 1993. Skin contamination, airborne concentrations, and urinary metabolite excretion of propoxur during harvesting of flowers in greenhouses. Amer. J. of Industrial Medicine. 24(5):593-603.

[24] Meuling, W.J.A, et al. 1997. The influence of skin moisture on the dermal absorption of propoxur in human volunteers: a consideration for biological monitoring practices. Science of The Total Environment 199 (1-2):165-172.

[25] USEPA. 1997. Reregistration Eligibility Decision (RED) Document. Office of Prevention, Pesticides and Toxic Substances. Washington DC.

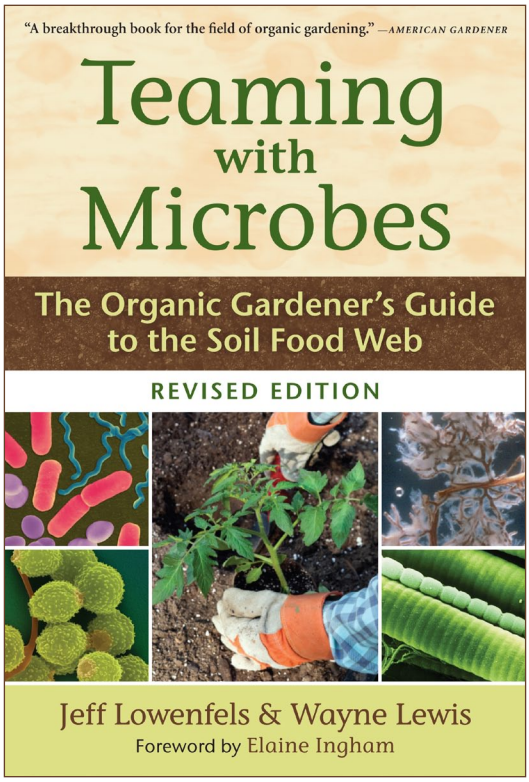
[26] Whyatt, RM, et al. 2003. Contemporary-use pesticides in personal air samples during pregnancy and blood samples at delivery among urban minority mothers and newborns. Environ Health Perspect. 111(5): 749–756.

by Terry Shistar

Teaming with Microbes: The Organic Gardener's Guide to the Soil Food Web

by Jeff Lowenfels and Wayne Lewis. Timber Press; Revised 2010. Illustrated hardcover, 200 pages.

I read *Teaming with Microbes* based on a recommendation by Beyond Pesticides board member and organic turf expert Chip Osborne. If you have ever heard one of Chip's talks (and if you haven't, check one out on the Beyond Pesticides website at www.beyondpesticides.org/forum/video/2009organiclandcare.htm), you have probably come away with a greater appreciation for the role of compost and compost teas in building organic soil fertility. You may have also come away wanting to know more about how they work.



Teaming with Microbes is perfect for addressing that curiosity about what it means to "feed the soil to feed the plants." Years ago, the original promoters of the organic method, J.I. Rodale and the Rodale staff wrote in The Complete Book of Composting:

At the very foundation of good nutrition is the soil —soil that is fertile and alive, that is kept in shape to grow plants as nature meant them to be grown. The life and balance in this soil is maintained by returning to it those materials which hold and extend life in a natural cycle, and aid in replenishing the nutrients needed to produce healthy, life-supporting crops. Soils that lack vital plant nutrients cannot give these food values to what is grown in them.

The book is divided into two sections. The first introduces members of the soil food web and their functions in the soil. The second section applies the science to growing annuals, perennials, and turf. The Appendix recaps soil food web gardening rules.

In the first section, *Teaming with Microbes* gathers together the latest scientific knowledge about how soil-dwelling organisms produce fertility —and presents it in a way that is easy to understand. Recent science has shown that J.I. Rodale and other organic pioneers were right —the soil is a living organism, and synthetic fertilizers and pesticides do kill the soil. The growth of all the plants we see above ground —from lettuce seedlings to redwood trees— results from a symbiosis between the plants and the fungi, bacteria, insects, and other soil-dwelling organisms. Plants do "team with microbes."

I need to mention the pictures. Even if you only look at the pictures of soil microbes, you will come away with a greater appreciation of soil biology. See a fungus capture a nematode. Look a nematode in the mouth. Look at nitrogen-fixing rhizobia living on the root nodule of a bean plant. I feel like I know all these guys a lot better from having seen their pictures.

The second section of the book shows readers how to learn about their own soil food webs, and how to enrich them through the use of compost, mulches, and compost teas. This edition of the book added a chapter on using mycorrhizal fungi, which contains a very short explanation of how organic soils sequester carbon —although "carbon sequestration" is never mentioned.

The authors write: *Glycoprotein molecules have several carbon sites. All this carbon has an immediate and extremely important consequence. As older hyphae die off, the carbon in the glomalin coating accumulates in the soil, bound up and slowly decomposing; it can take up to 100 years to be released. As the AM fungal network can be extremely extensive (in some soils, as much as three miles per teaspoon), this amounts to a great deal of carbon.*

The very first of the gardening rules is, "Some plants prefer soils dominated by fungi; others prefer soil dominated by bacteria." This is an important rule that many organic gardeners miss. Understanding why it is true and how to apply it are themes that are central to the book and to our understanding of soil fertility. *Teaming with Microbes* helps us to use that understanding to create compost that is appropriate for different situations. It is an important addition to the library of any organic gardener or land manager.

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