

Pesticides and You

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

Volume 32, Number 3

Fall 2012

Biosolids or Biohazards?

Also in this issue:

Maintaining a Delicate Balance: Eliminating phosphorus contamination with organic soil management

Rodenticides, Hazardous to Children, on Their Way Out

Keeping Bees in Towns and Cities

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Medical Community Takes a Stand on Pesticides

In the last month, we have seen an important development as the medical community takes a stand on pesticides. The American Academy of Pediatrics (AAP), in the December issue of its journal *Pediatrics*, published a policy statement and technical report with a warning on pesticides. About the same time, Kaiser Permanente, the nation's largest health care plan, issued a piece in its newsletter, *Partners in Health*, that warns people about genetically engineered corn in their diet. It is critical to engage the medical community in both defining the hazards *and* the solutions. That's why AAP's focus on alternatives to pesticides in its recent policy statement, *Pesticide Exposure in Children*, and in another journal piece it published a month earlier, sends an important signal that we need to change course for the sake of our health and the environment.

Medical input on pesticides is growing

Over the years, we have seen the medical community weigh in on pieces of the pesticide problem. In 1997, the Council on Scientific Affairs of the American Medical Association (AMA) said, "Particular uncertainty exists regarding the long-term health effects of low dose pesticide exposure...Considering [the] data gaps, it is prudent ... to limit pesticide exposures ... and to use the least-toxic chemical pesticide or non-chemical alternative." More recently, the AMA raised concerns about the efficacy of the antibacterial triclosan, saying, "[I]t may be prudent to avoid the use of antimicrobial agents in consumer products." We have seen important articles in the *Journal of the American Medical Association (JAMA)*, including one on elevated hazards associated with children's exposure to pesticides in the school environment and another linking rotenone exposure to Parkinson's disease. In 2010, the AMA on its website, *American Medical News*, addressed the link between organophosphate pesticides and ADHD (attention deficit and hyperactivity disorder).

Despite this important involvement, associations of U.S. medical practitioners have not engaged with a broad analysis of the large and growing body of science linking pesticides to adverse health effects, now captured in the AAP's policy statement and technical report. In Canada, in 2004, the Ontario College of Family Physicians (OCFP) strongly recommended that people reduce their exposure to pesticides wherever possible, after releasing a comprehensive review of research on the effects of pesticides on human health. OCFP's *Systematic Review of Pesticide Human Health Effects* shows consistent pesticide links to serious illnesses such as cancer, reproductive problems and neurological diseases, among others, and concludes that children are particularly vulnerable to pesticides.

Raising organic

While the October report, *Organic Foods: Health and Environmental Advantages and Disadvantages*, in *Pediatrics* has been criticized for not being unequivocal, its conclusions send some important signals, such as, "In terms of health advantages, organic diets have been convincingly demonstrated to expose consumers to fewer pesticides associated with human disease. Organic farming has been

demonstrated to have less environmental impact than conventional approaches." This is a broad conclusion that covers both overall exposure associated with disease and environmental contamination and degradation. The take away message advises that doctors talk to their patients about these issues, presumably because of the association to human disease. Could the language be stronger? Of course. But it elevates the conversation in the medical venue. Bottom line: this discussion is good and we should encourage it.

Meanwhile, the trade association for the pest control industry wants this discussion to go away, understandably. Many –not all– in the industry have built their business model on spraying poisons, not preventing pests through the elimination of the conditions that are attractive to pests and the adoption of exclusion techniques that keep pests out. Instead, the industry holds on to arguments that long ago proved out-of-touch, by pointing to EPA's pesticide registration as proof of safety, despite its acknowledged limitations.

A systems change

With a first do no harm orientation, the medical discussion can and should advance a dramatic transformation in the adoption of alternative systems that eliminate the need for hazardous pesticides. With a focus on the critical importance of adopting prevention-oriented organic systems, this issue of *Pesticides and You* takes a close look at problems associated with toxic chemical-based and biosolid-based systems for managing land. Clearly, there are things that we do in the management of land and buildings that establish vulnerability to unwanted insects, plants, and disease. As a result, we must evaluate practices and material inputs –starting with the soil– in this context, asking what they may do to undermine the ecological balance and the power of nature.

The systems in organic that are critical to success require a deep respect for soil life, its protection and nurturing. Solutions to environmental problems are most often found not simply in product replacement or the preference for one product over another, but in the overall management system –which is the premise of the certified organic systems approach.

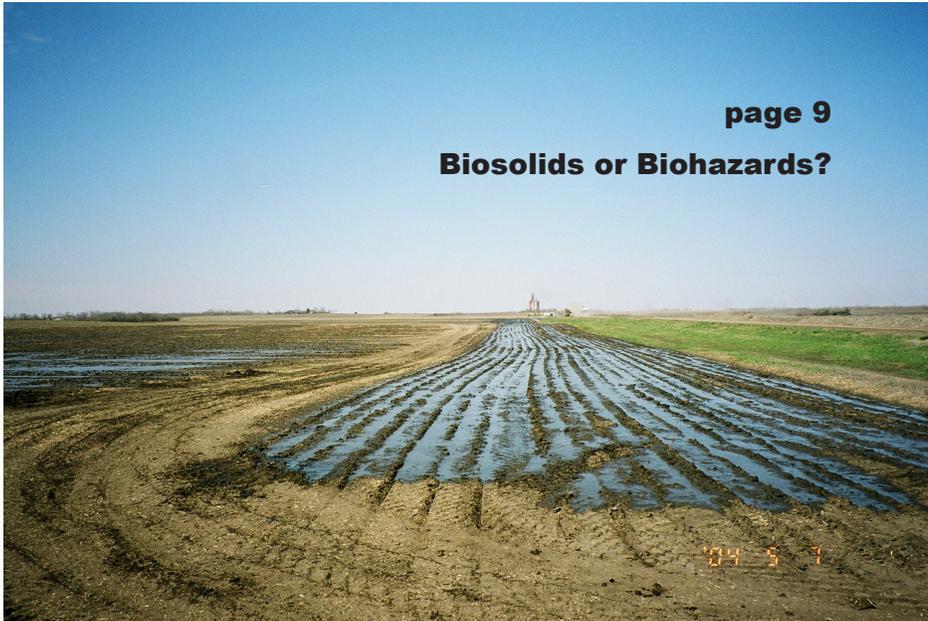
Our choice is becoming clearer every day, as we see environmental degradation unfolding before our eyes. We have started the rebuilding of natural processes with organic systems that offer us the opportunity to begin repairing the planet. We must take bold steps

that recognize that the cost of surviving environmental contamination far outweighs the cost of preventing it. We are moving ahead and look to an ever-stronger voice coming from the medical community.



Best wishes for a happy and healthy holiday season, *Jay Feldman, Executive Director of Beyond Pesticides.*

Contents



page 9

Biosolids or Biohazards?

2 Mail

What's Flowing Through Your Front Yard; Clarifying Maine's Proposed Legislation; Member Spotlight; Beyond Pesticides Daily News Blog

4 Washington, DC

Judge Halts GE Crops on SE Wildlife Refuges, OKs Plans for Midwest; U.S. EPA Fails to Protect Salmon from Dangerous Chemicals; EPA Permit Allows Unregistered Pesticide Use on GE Cotton; Rally to Save the Bees Outside EPA Office Headquarters

6 Around the Country

Pediatricians Say Organic Foods Reduce Kids' Pesticide Exposure; Latest Study Links Bee Deaths to Pesticides; City Adopts Organic Land Management Policy; Goat Grazing Takes Off Across the Country; Oregon Looks to Protect Waterways From Pesticide Runoff; Natural Oils Show Promise Against Beetles in Avocados

9 Biosolids or Biohazards?

16 Maintaining a Delicate Balance

Eliminating phosphorus contamination with organic soil management

21 Rodenticides, Hazardous to Children, on Their Way Out

Despite non-toxic alternative controls, chemical industry fights to retain toxic chemicals

24 Resource: Keeping Bees In Towns & Cities

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What's Flowing Through Your Front Yard?

Dear Beyond Pesticides,

We recently moved into a new house, and there's a drainage ditch in the front yard where my kids often play. We are concerned about what chemicals might be in that water. My wife and I plan on getting a water test done on the water flowing through the drain. What are some of the chemicals I should test, and what are the health implications if harmful chemicals are found?

-Don

Hi Don,

Thank you very much for contacting Beyond Pesticides. Water tests on open drains provide a snapshot of what is moving through your property at the time of the sample. There may be more or less of a substance based on several factors -including time of day, recent rainfall, and the actions of your neighbors or industry in the area. Therefore it is difficult to determine the health implications for

chemical detections in storm drain water as its contents can change quickly.

Testing for pesticides is more expensive than testing for bacteria or nitrates. Of-



Drainage ditches such as the one pictured above can contain harmful chemicals depending on what is used on lawns in your region.

ten it is most cost effective to screen for a range of chemicals which may be in your area. Speaking with your local health department or agricultural extension office about which pesticides are applied most often in your region should help you determine which chemicals to screen. If you live close to an agricultural field you may want to contact the farmer and ask him directly which chemicals he applies to his land. Likewise, if living near a golf course, you may want to ask the head groundskeeper if they apply pesticides or other toxic chemicals.

Knowledge of the activity around your house is critical to knowing the chemicals flowing through your front yard. It is always helpful to speak with your neighbors and voice your concerns about the use of hazardous chemicals. And, when in doubt, try to avoid areas where you believe there might be contamination. If you'd like additional information on how to speak with your neighbors, or recommendations on water testing companies, contact Beyond Pesticides at 202-543-5450 or info@beyondpesticides.org.

Member Spotlight: Rose Rowe

About twice every year, Rose calls Beyond Pesticides to request several back-copies of *Pesticides and You*. She then takes our newsletter down to her local organic grocer, Kristina's Natural Ranch Market in Fresno, CA, where she places it on a rack for other customers to "check-out" and bring back later, just like a library. "It's an excellent way to get the word out," says Rose.

We would like to thank Rose for helping to spread the word about our mission.

From the Web

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

Clarifying Maine's Proposed Legislation

Dear Beyond Pesticides,

The introduction of the blog post "Proposed Rulemaking in Maine Undermines Comprehensive School Pesticide Reform," from Beyond Pesticides' Daily News Blog, September 28, 2012 says:

"Unfortunately, new amendments to

Maine's school pesticide legislation make no mention of safer, preventive pest management practices, or the use of least-toxic pesticides only as a last resort, setting back efforts to reform pesticide legislation for schools in Maine. Should these new amendments be approved, students in Maine will not receive the same protections as students in other states that have been eliminating unnecessary pesticide use by adopting pest prevention practices and using least-toxic pesticides as the last

resort.”

But the existing Maine rules which are not part of the proposed changes in this latest notice of proposed rulemaking state:

“...Prior to any pesticide application the following steps must be taken and recorded:

- 1. monitor for pest presence or conditions conducive to a pest outbreak,*
- 2. identify the pest specifically,*
- 3. determine that the pest population exceeds acceptable safety, economic or aesthetic threshold levels, and*
- 4. utilize non-pesticide control measures that have been demonstrated to be practicable, effective and affordable.*

When a pesticide application is deemed necessary, the applicator must comply with all the requirements of Chapter 31 –Certification and Licensing Provisions/ Commercial Applicator. The applicator must also take into account the toxicity of recommended products and choose low-risk products based on efficacy, the potential for exposure, the signal word on the pesticide label, the material safety data sheet, other toxicology data and any other

label language indicating special problems such as toxicity to wildlife or likelihood of contaminating surface or ground water.”

And a new section of the proposed rule if adopted as written says,

“All pest management activities shall be undertaken with the recognition that it is the policy of the State to work to find ways to use the minimum amount of pesticides needed to effectively control targeted pests in all areas of application. In addition, it is the Board’s policy that pesticide applications on school grounds, strictly for aesthetic purposes, should be avoided.

Seems like the existing and proposed law does all the things mentioned in the intro of the article?

We welcome all comments, but hope they will be based on the existing law and the changes shown in the notice of proposed rulemaking found at <http://1.usa.gov/11zAMJq>

-Gary Fish, Manager of Pesticide Programs for the state of Maine

Mr. Fish,

Thanks for reaching out on this. We are pleased that you and the state of Maine are working to protect children from toxic pesticide use. While we support attempts to clarify the interest in moving toward non-pesticide controls and your efforts in that regard, we would like to see a lot more clarity in the definition of IPM and less discretion given to applicators to make determinations on exposure and safety –areas that are outside their expertise, generally. Unless the regulations are clear about practices and allowed materials, including the prohibition of substances that are associated with adverse effects, unnecessary pesticide use may occur. In our experience, with sound pest prevention and exclusion techniques (caulking, doorsweeps, habitat modification, and cultural practices) and the use of biological management outdoors (attention to soil health, natural predators, and ecological balance), the use of toxic substances is not necessary and, in fact, less effective than the preventive approach. On behalf of Beyond Pesticides’ members in Maine, we look forward to working with you.

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

Excerpt from Beyond Pesticides’ original blog post (9/13/2012): The Solution to Pesticide Pollution? Keep Organic Growing! Public Comments Due by Sept. 24, Organic practices are the solution to pesticide pollution. It is critical, therefore, that public health and environmental advocates, and consumers of organic food protect and strengthen the integrity of organic certification -so that it grows to become the mainstream food production and land management system.

From Lyn Marie

“The question is whether any civilization can wage relentless war on life without destroying itself, and without losing the right to be called civilized.”~Rachel Carson.

We must stop the use of pesticides on our food which go into the water we drink and the air we breathe. Rising rates of cancer, deaths of sentient beings, the degradation of the land, we create our own doom. Think of the children. Organics, without pesticides, without being genetically modified, are vital to our health and survival.

Express Yourself

Beyond Pesticides welcomes your questions, comments or concerns. Have something you’d like to share or ask us? We’d like to know! If we think something might be particularly useful for others, we will print your comments in this section. Mail will be edited for length and clarity, and we will not publish your contact information.

There are many ways you can contact us: Send us an email at info@beyondpesticides.org; give us a call at 202-543-5450, or simply send questions and comments to: 701 E Street SE, Washington, DC 20003.

Judge Halts GE Crops on SE Wildlife Refuges, OKs Plans for Midwest

In two separate rulings, a federal court ruled in favor of halting cultivation of genetically engineered (GE) crops in all national wildlife refuges in the southeastern U.S., while leaving the door open for planting GE crops in the Midwest. Both lawsuits, filed by Public Employees for Environmental Responsibility (PEER), Center for Food Safety (CFS), and Beyond Pesticides, are a part of a series of legal actions taken against the U.S. Fish and Wildlife Services (FWS) for entering into cooperative farming agreements that allow GE crops on wildlife refuge sites without the environmental review required by the *National Environmental Policy Act* (NEPA) and refuge management laws.

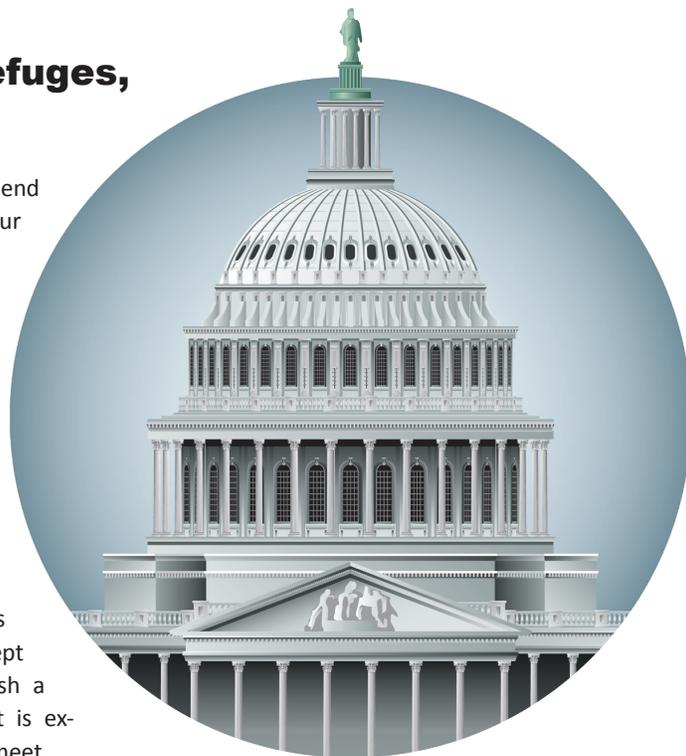
“How GE crops can be judged to carry significant environmental impacts in the Southeast and not in the Midwest is difficult to understand and accept,” said Paige Tomaselli, staff attorney with the Center for Food Safety. “However, short of a much-needed nationwide settlement, this

is good news in our fight to end the growing of GE crops on our nation’s wildlife refuges.”

While national wildlife refuges have allowed farming for decades, the practice is losing support among refuge managers, especially since some conventional crops, such as soybeans and corn, are available mainly in GE strains. Refuge policy states that GE crops should not be used except when essential to accomplish a refuge purpose—a test that is extremely difficult to honestly meet.

The lawsuits stress that the GE crops actually conflict with the protection of wildlife, the main purpose of the refuges. GE crops also require more frequent and increased applications of toxic herbicides, which has fostered an epidemic of “super weeds”

as weeds have mutated. In addition, GE farming has led to the uncontrolled spread of the engineered DNA to conventional, organic crops and wild relatives, in effect contaminating the wild from federal wildlife preserves.



U.S. EPA Fails to Protect Salmon from Dangerous Chemicals

Pesticide manufacturers have recently tried to persuade a federal appeals court to overturn restrictions against spraying several common pesticides near waterways. The controversy stems from a 2008 finding by National Marine Fisheries Service (NMFS) that common pesticides, particularly chlorpyrifos, diazinon and malathion, jeopardize the health of federally protected salmon species and should not be sprayed within 500 to 1,000 feet of waterways. While the U.S. Environmental Protection Agency (EPA) has requested that chemical companies change their pesticide product labels voluntarily to include buffer requirements, Dow AgroSciences, Makhteshim Agan, and Cheminova have refused to take the request seriously and do not believe that the comments made by NMFS will hold up in court.

EPA is mandated by law to protect dwindling species like salmon under the *Endangered Species Act* (ESA). Salmon, in particular, are a good indicator of how well we are taking care of both the marine and terrestrial ecosystems, because they live in streams, lakes, rivers, estuaries, and open ocean. They are also extremely sensitive to changes in water quality and upstream changes to the river flow, turbidity, and temperature. By failing to implement buffer mandates, EPA is responsible for endangering salmon and ecosystem health under ESA. Conservation groups and fisherman have previously filed lawsuits against EPA with demands that pesticide restrictions be implemented around salmon streams. Regulatory buffers surrounding streams and watersheds have not been fully implemented by EPA, though it is required to by law. Despite this and other evidence that supports the need for buffer zones, EPA has withheld action until the 4th U.S. Circuit Court of Appeals resolves the case. EPA can force chemical companies to change their labels by cancelling existing labeling and issuing new ones, but it would have to prove in federal court that the conclusions made by the NMFS are correct, and officials are reluctant to be involved in a long court battle. Pesticide manufacturers have already requested that the judge throw out the 2008 biological opinion by NMFS on spraying common pesticides near waterways. When asked by a 4th Circuit judge about the economic effects of buffers, attorney Mark Haag said, “The determination of jeopardy is based on biology. It’s not based on economic impact.”

EPA Permit Allows Unregistered Pesticide Use on GE Cotton

The U.S. Environmental Protection Agency (EPA) granted an emergency exemption to allow the unregistered use of the herbicide fluridone on cotton to control glyphosate-resistant weeds in November. This is the first time EPA has granted an emergency exemption request for the use of fluridone on cotton, and it will expire in 2014 unless evidence is brought to EPA showing the chemical to be unsafe. Fluridone, registered for aquatic uses only, is rapidly absorbed, metabolized, and excreted by mammals, and at sufficiently high doses is associated primarily with changes in the liver, reduced body weight, and reduced food consumption. There is some evidence that its major degradate, N-methyl formamide (NMF) causes birth defects.

Under Section 18 of the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA), or its emergency exemption program, EPA allows the use of pesticides that are not registered for a particular crop, or in some cases not registered for use at all, but making progress toward registration. The Section 18 provision has been used in the past to skirt pesticide regulations meant to ensure health and safety and has resulted in the widespread application of unreviewed, and often unnecessary hazardous substances. Because resistance to herbicides in genetically engineered crops is predictable and expected, Beyond Pesticides has challenged EPA's use of the emergency exemption provision in this and other similar cases. Reoccurring and predictable problems like weed resistance to herbicides is a wake-up call for farmers and EPA to reevaluate and implement alternative biological and cultural management practices for long-term prevention. A reliance on the "chemical fix" or the "pesticide treadmill" has been shown to exacerbate the problem when pest resistance to the chemical inevitably occurs. Data has shown that glyphosate-tolerant GE cropping patterns lead to weed resistance. Additional herbicide options, like fluridone, will not stem the tide of herbicide-resistant weeds. This process ensures that farmers are stuck on a pesticide treadmill that constantly demands greater amounts of synthetic inputs, including GE seeds, and rewards chemical suppliers at the expense of farm profitability and the environment.

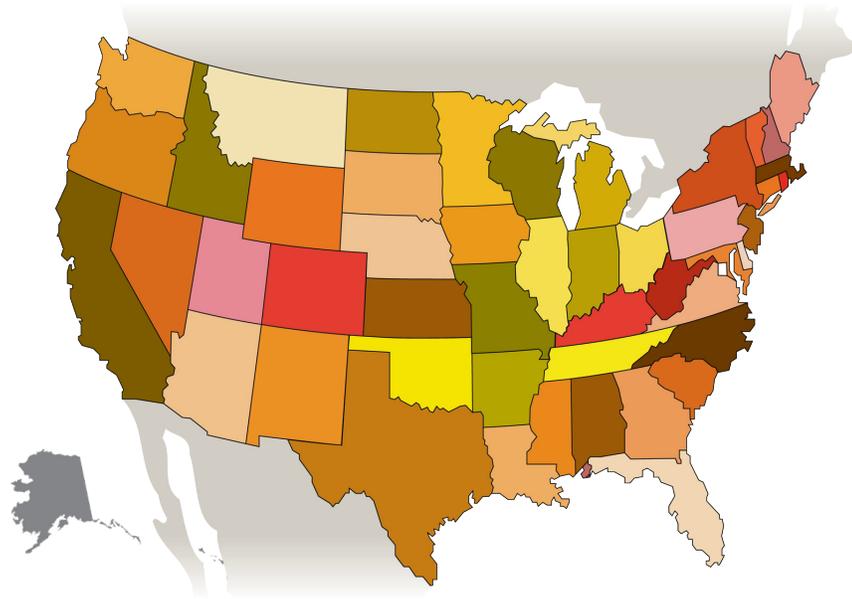
Rally to Save the Bees Outside EPA Office Headquarters

On October 25, Beyond Pesticides (BP), along with our partners, the Center for Food Safety (CFS), Pesticide Action Network North America and Sierra Club (SC), rallied outside EPA headquarters to demand that the agency take actions to save the bees. Congressman Dennis Kucinich joined other speakers, including Beyond Pesticides' Executive Director Jay Feldman, film documentarians Maryam Henein of *Vanishing of the Bees*, Sierra Club representative Kevin Hansen of *Nicotine Bees*, commercial and urban beekeepers, and more. Commercial beekeeper David Hackenberg brought his 40-ft flatbed truck filled with empty hives and signage: "This Truck Holds 200 Hives. It Would Take 3,750 Trucks to Equal the Number of Hives Lost Each Year. That's 40% of Hives in the U.S.!"

In addition to the rally, CFS, BP, and SC filed a *60-Day Notice* letter with EPA this fall announcing the intent to jointly sue the agency for *Endangered Species Act* (ESA) violations. The potential lawsuit highlights EPA's continuing failure to ensure, through consultation with the U.S. Fish and Wildlife Service, that its numerous product approvals for the neonicotinoid insecticides clothianidin and thiamethoxam are not likely to jeopardize any federally-listed threatened or endangered species. The *60-Day Notice* cites several violations of ESA, all of which address EPA actions that have enabled clothianidin and thiamethoxam to be applied over a vast amount of U.S. farmland and in, or near, a wide range of critical habitats and ecosystems. Despite EPA's recognition of the acute and chronic toxicity risks to endangered and threatened birds, mammals and insects from these chemicals nearly a decade ago, the agency has continued to ignore concerns surrounding the effects on these critical species.



Beyond Pesticides' staff joined Center for Food Safety, beekeepers and other concerned citizens outside EPA's headquarters, urging the agency to take action and ban the use of pesticides toxic to honey bees.



Pediatricians Say Organic Foods Reduce Kids' Pesticide Exposure

The American Academy of Pediatricians (AAP) has weighed in on the organic food debate, recognizing that lower pesticide residues in organic foods may be significant for children. AAP also notes that choosing organic is based on larger environmental issues, as well as human health impacts like pollution and global climate change. This is the first time the AAP has made a statement on organic foods, concluding that it is most important for children to eat a wide variety of produce, but that pediatricians should talk to patients about the potential health and environmental benefits of choosing organic. The report, "Organic Foods: Health and Environmental Advantages and Disadvantages," was published in the journal *Pediatrics* and is available online.

Though there have been conflicting messages in the media on AAP's report, the academy is clear that organic foods do provide health advantages by way of reducing exposure to pesticides, especially for children. It also finds "sound evidence" that organic foods contain more vitamin C and phosphorus. According to the report, "In terms of health advantages, organic diets have been convincingly demonstrated to expose consumers to fewer pesticides associated with human disease. Organic farming has been demonstrated to have less environmental impact than conventional approaches."

AAP recommends that, "Pediatricians should incorporate this evidence when discussing the health and environmental impact of organic foods and organic farming while continuing to encourage all patients and their families to attain optimal nutrition and dietary variety." The report reviews the health and environmental issues related to organic food production and consumption. It defines the term "organic," reviews organic food labeling standards, describes organic and conventional farming practices, and explores the cost and environmental implications of organic production techniques. It also examines the evidence available on nutritional quality and production contaminants in conventionally produced and organic foods.

Latest Study Links Bee Deaths to Pesticides

A new study published in *Nature*, "Combined pesticide exposure severely affects individual- and colony-level traits in bees," concludes that when bees are exposed to pesticides their colonies have a greater propensity to fail. This study adds to the body of science that shows toxic pesticide use is undermining our food supply, and again reinforces the urgent need for regulatory action to protect pollinators.

The study, which was designed to mimic real world conditions that bees are exposed to in the field, followed 40 bumblebee colonies for four weeks. The research reveals that chronic exposure to two commonly-used pesticides, the neonicotinoid imidacloprid, and the synthetic pyrethroid λ -cyhalothrin (LC), at field level concentrations impairs natural foraging behavior and increases worker mortality. Neonicotinoids, such as imidacloprid, are taken up by a plant's vascular system and expressed through the pollen, nectar, and guttation droplets from which bees forage and drink. Synthetic pyrethroids such as LC are sprayed directly on crops, including their flowers, where bees can become topically exposed. The authors note, "Foraging bees are thus simultaneously exposed to both chemicals in the field, making them excellent candidates to investigate the potential for combinatorial effects of pesticide exposure."

While the study only focused on bumblebees, Prof. Douglas Kell, Ph.D. of the Biotechnology and Biological Sciences Research Council notes, "Bumblebees play an important role in pollination, working earlier in the morning and later into the evening than many bees. Understanding the threats to all insect pollinators is vital if we are to ensure we mitigate the impact of their decline on the production of agricultural and horticultural crops. The results of this study contribute to a wider initiative to help inform strategies for securing the futures of all insect pollinators."

City Adopts Organic Land Management Policy

The city of Durango, CO has recently enacted an organic land management policy that eschews the use of toxic chemicals on city owned property. The ordinance was put together by a group of local advocates, Organically Managed Parks Durango. The group utilized a petition process defined in the City Charter that gives voters the power to propose ordinances to the City Council, which must either approve the ordinance or send it back to residents for a vote.

The ordinance, based on Beyond Pesticides' model policy, focuses on developing healthy soil and establishes an organic

land management coordinator to oversee the program. The ordinance also allows for pesticides to be used in the case of a public health emergency only after all other options have been exhausted.

Before the policy was enacted, there were two parks maintained without chemicals in the City of Durango, Brookside Park and Pioneer Park. According to a narrative report prepared by Organically Managed Parks Durango, the use of both of these parks has increased in popularity since the parks have become chemical-free, particularly among families with small children. The City of Durango's Parks Master Plan

states that Brookside Park is in "excellent condition," and the turf in both of the chemical-free parks is a highly functional, beautiful green lawn and beckons to children of all ages for a pleasing roll about in the completely chemical-free grass.

The passage of this ordinance adds to the growing movement across the country calling for increased restrictions on the use of dangerous chemicals in the public sphere. In addition to Durango, CO, Beyond Pesticides has worked with localities throughout the U.S. in an effort to promote organic land care systems and restrict the hazardous use of chemicals.

Goat Grazing Takes Off Across the Country

In addition to adopting an organic land management policy, Durango, CO has also taken up goats! Just outside of the town in the neighborhood development Three Springs, as well as a 65-acre stretch of land that formerly occupied a Chevron holding pond, goats are currently being employed to reclaim the land. The herd of 850 goats is operated Lani Malmberg, owner of Ewe4ic Ecological Services, and a Beyond Pesticides board member.

In other recent goat news, Chicago's O'Hare International Airport announced that it is planning to sign on a shepherd and approximately 30 goats and sheep to graze on overgrown brush at the perimeter of the airport this fall. The animals are expected to clear about 250 square feet of vegetation per day. Airport officials sought out the goats in order to eliminate an overgrowth of poison ivy and poison oak, and reduce the habitat for wildlife hazardous to airport operations, such as birds or deer.

"The animals are a more cost-efficient and environmentally friendly alternative for brush removal," Department of Aviation spokeswoman Karen Pride said. The choice to use goats at O'Hare was also made because the overgrown property is difficult for machinery and pesticide applicators to reach due to hills and standing water. The area where the goats will be grazing is outside the security fence, so there's no danger of goats straying onto the runways.

Chicago O'Hare is not the only airport using grazing animals to deal with difficult landscape maintenance problems. Chicago joins a list of other cities, including Atlanta and San Francisco, that use grazing animals to help maintain portions of their airport and a multitude of other cities that use goats as part of their weed management plans.

Goats are often more efficient at eradicating weeds, and are more environmentally sustainable than using harmful pesticides. Once goats graze a weed, it cannot go to seed because it has no flower and cannot photosynthesize to take in sunlight and build a root system because it has no leaves. Grasses are a last choice for goats, which means the desirable grass species are left behind with natural fertilizer to repopulate the land. Goats also eat poisonous plants, such as poison ivy and poison oak, and can handle them without getting sick.



Donny Benz, with Ewe4ic Ecological Services, directs a herd of goats to graze. Image courtesy Shaun Stanley/Durango Herald

Oregon Looks to Protect Waterways From Pesticide Runoff

The Oregon Department of Agriculture (ODA) is looking to revamp the way it enforces the 1993 *Agricultural Water Quality Management Act* in order to decrease the amount of pesticides that end up in the state's waterways from agricultural nonpoint source pollution. While a new plan could benefit the health of Oregon residents and its waterways, it is in danger because politicians and some farmers believe it will be overly burdensome and increase costs.

ODA Director Katy Coba and her staff floated the new, firmer approach to water quality late last year. The state would target limited resources to the most polluted streams, ramp up education of landowners, and accelerate restoration projects, tapping state and federal subsidies. Over time, trees, shrubs and grasses would shade and cool rivers and filter pesticide and fertilizer runoff, benefiting threatened salmon runs. Before-and-after water monitoring will confirm long-term results. As a last resort, ODA would pursue uncooperative landowners, starting with warnings, instead of relying on outside complaints for enforcement. The Department unveiled the proposal in

December before the state's water quality committee, including an aerial photo of the threatened Zollner watershed.

The movement to this new system will be politically challenging for ODA because some farmers and conservation districts see the proposal as a sign of a more active and intrusive governmental agency.

ODA, with just six field staff in its water quality program for 38,000 farms, relies on the conservation districts for information and ground work in order to be successful.

Oregon has thousands of miles of waterways. Roughly 15,000 miles of these waterways are listed as impaired, and nearly half of the 11,000-plus miles of waterways in Willamette River basin need more streamside plants, according to a 2009 state report. These plants help reduce the amount of runoff by reducing the amount of pesticides that can reach waterways.

Zollner creek runs through the flatlands below Mt. Angel

Abbey in the Willamette Valley and was found to be contaminated with pesticides, including the chemical diuron, which is harmful to fish and aquatic organisms. The stream has registered high levels of pesticides and fertilizers since the mid-1990s, and contamination levels detected in the Zollner and around Oregon are high enough to cause harm to aquatic life, including native salmon and steelhead.

Legislators from both parties are watching ODA closely as the proposal moves forward. If they don't like what they see, bills to restrict or expand ODA's authority could pop up in the legislature next year and the future of this program may be in jeopardy.



Natural Oils Show Promise against Beetles in Avocados

Researchers are investigating natural essential oils as traps for Red Bay Ambrosia beetles, the primary vector of laurel wilt fungus, which attacks trees, including avocado trees in the southeastern U.S. Two important oils, phoebe oil and manuka oil, have been discovered as potent antifungal agents that can be applied to avocado trees. Both manuka oil and phoebe oil are sourced from plant-based materials, that are readily available, and are effective as a trap bait for monitoring distribution and population trends. Preliminary research indicates that its primary components, leptospermone and flavesone, are 5 to 10 times more effective at treating fungal infections than Australian tea tree oil. Essential oils are complex mixtures of different organic components, the most prominent single substance is triketone leptospermone in manuka oil. This combination shows a high level of antimicrobial activity. However, few studies have analyzed the toxicity of manuka oil outside the cosmetic and medicinal industry. Those that have indicate that in comparison to other myrtaceous essential oils manuka demonstrates moderate toxic behavior in cell cultures.

The invasive Ambrosia beetle from Asia has spread to the Carolinas, Florida, and west to the Mississippi, killing 90 to 95 percent of infected trees and significantly altering forest ecosystems. Scientists are concerned that the beetles will soon reach Mexico and California, which are major avocado production areas. If only half of California's commercial avocado trees died, estimates indicate it would mean a total economic impact of about \$27 million. In response to growing concerns, the U.S. Department of Agriculture (USDA) is researching alternative strategies to monitor and eventually control the spread of the Ambrosia beetle.

Biosolids or Biohazards?



City of Lawrence, Kansas Wastewater Treatment Plant has a biosolids recycling program. According to the city, 90-95% of the biosolids are currently applied to local agricultural fields as a fertilizer and organic matter source. The remainder is made available for public distribution for residential uses on landscaping, gardening, etc. Photo by Joseph Mark Jarvis, <http://bit.ly/RBJ7uj>.

(Ed. note: This piece has been edited to clarify issues related to the plant uptake of contaminants in biosolids, 5/1/13)

by Xoco Shinbrot

Biosolids, or treated domestic sewage sludge, processed at wastewater treatment plants and used as fertilizer, is something that few people think about when they flush the toilet. However, treated and packaged sewage sludge has gained increasing attention and generated heated discussion as researchers increasingly find that it contains high concentrations of known toxicants and heavy metals.

Communities around the nation are required to treat their wastewater under the *Clean Water Act*. The wastewater treatment process produces the semi-solid by-product called sewage sludge, or biosolids, which may be applied to the land, incinerated or land-filled, depending on the level of treatment. According to the U.S. Environmental Protection Agency (EPA), of approximately seven million dry tons of biosolids produced each year,¹ 50 percent is applied to land.² While less than one percent of the nation's agricultural land is biosolid-treated, biosolid application is increas-

ingly considered by farmers, homeowners, and landscapers as an inexpensive and rich source of nutrients for their plants and agricultural commodities. Biosolids can be applied on farms by conventional farmers, as long as they receive a permit from their EPA Region. Users must prove that their application meets the human health standards of the *Standards for the Use or Disposal of Sewage Sludge*,³ which limits the concentration of nine heavy metals and four pathogens. Proponents frame the discussion around its use as a solution to future fertilizer shortages, touting it as a sustainable option that should be considered compatible with organic agriculture. However, there are a variety of chemicals in biosolids that people flush into the system, such as pharmaceuticals, household care products, and a cocktail of other constituents that are not removed during waste water treatment. Currently, USDA organic certification is the only regulatory safeguard from biosolids threats to human health, given their prohibition in the *Organic Foods Production Act*.

Toxic Findings, Limited Regulation

Growing concern has prompted EPA to increase its efforts to answer questions about the presence of a broader range of chemicals in biosolids. In 2009, EPA released the results from its *Tar-*

getting *National Sewage Sludge Survey* (TNSSS), which measures chemical concentrations in land-based biosolid application areas.⁴ The results are striking. Out of 84 samples:

- 27 metals are found in virtually every sample with antimony found in no less than 72 samples;
- Of six semi-volatile organics and polycyclic aromatic hydrocarbons (PAHs), four are found in 72 samples, one is found in 63 samples and one found in 39 samples;
- Of 72 pharmaceuticals, three (i.e. ciprofloxacin, diphenhydramine, and triclocarban) are found in all 84 samples, nine are found in at least 80 samples;
- Of 25 steroids and hormones, three steroids are found in 84 samples and six are found in 80 samples; and,
- All flame retardants, except one, are found in nearly every sample.

Over the past 30 years, a significant body of research has been compiled on the organic chemical contaminants in land applied biosolids that support these findings. While the focus has ranged from persistent organic pollutants, such as chlorinated dioxins/furans, to polycyclic aromatic hydrocarbons, organochlorine pesticides, heavy metals, PCBs, and pharmaceutical contaminants, only dioxins have been assessed by EPA. While they took no action based on the assessment, they determined that risks were below the levels of action.

The results of TNSSS prompted EPA to develop a list of nine pollutants (nitrite, nitrate, barium, manganese, silver, fluoranthene, pyrene, and 4-chloroaniline) that are being evaluated based on biosolids exposure and hazards assessments. EPA officials have indicated that rulemaking on these nine chemicals may take place within 2013 or 2014. As for more than 130 other pollutants identified in TNSSS, no timeline for rulemaking has been set.

EPA's failure to fully regulate biosolids and threats to human health has come under scrutiny as news articles, exposés, and non-fiction novels have critiqued land applied sewage sludge. John Stauber and Sheldon Rampton were two of the first authors, in their exposé *Toxic Sludge is Good for You*, to publicly chastise public relations manipulators for misleading the public on biosolids. The authors examine the ongoing marketing campaign to redefine sewage sludge as a beneficial, cheap, and risk-free fertilizer. As part of this effort to sell sludge, the most active pro-sludge advocacy group, Water Environment Federation (WEF), coined its new name. "It's not toxic, and we're launching a campaign to get people to stop calling it sludge. We call it 'biosolids,'" said then WEF director of information Nancy Blatt.

During this campaign, companies like Heinz, Nestlé, and Del Monte, which expressed staunch support of biosolid-free agriculture, began to seriously consider growing their raw agricultural products in soils treated with biosolids.⁵ Representatives for Del Monte indicated that their "long-standing position . . . to avoid using raw agricultural products grown on soils treated with municipal sludge" was likely to change in the future. It's unclear whether Heinz and Nestle have changed their stance, but according to their website on corporate responsibility, Del Monte has avoided products grown with sewage sludge.⁶ Many conventional farmers and food processors, however, still use biosolids as a crop fertilizer and have strongly opposed labeling legislation (see H.R. 207, *Sewage Sludge In Food Production Consumer Notification Act* of 2005) to inform consumers on whether food is grown on biosolid-treated land.

Human Health and Unregulated Toxicants

Plant uptake and ingestion

Since the early 1980s, scientists have been cognizant of heavy metal uptake by food plants fertilized with biosolids. Keefer et al.

(1986)⁷ analyzed the impact of biosolids rich in cadmium, zinc, nickel, copper, chromium, and lead on the edible and inedible portions of radishes, carrots, cabbage, green beans, sweet corn and tomatoes grown in biosolids. As expected, many of the crops in biosolid amended soils have higher concentrations of heavy metals than the control crops. Nickel concentration is higher in both edible and inedible parts of most of the vegetables, and copper and zinc concentrations are also higher in those vegetables. Though levels are highly dependent on the species type, the heavy metal, the plant part, and the

level of absorption, concentrations of heavy metals in crops grown in sludge-amended soil can have serious consequences.

For example, cadmium accumulation varies distinctly in different plant types, but is regarded as the most hazardous metal element based on its concentration in sewage sludge. In the short-term, ingesting high levels of cadmium residues can cause vomiting and stomach irritation, but prolonged exposure to low levels can cause kidney damage and bone fragility.⁸ The Agency for Toxic Substances and Disease Registry cites research showing that cadmium tends to accumulate in plant leaves, and therefore is more risky, especially for leafy vegetables grown on contaminated soils.⁹ Tobacco, lettuce, and spinach, are known to be particularly prone to cadmium absorption. Currently, the *Standards for the Use or Disposal of Sewage Sludge*¹⁰ regulate the application of biosolids with concentration limitations for heavy metals—specifically for arsenic, cadmium, copper, lead, mercury, molybdenum, nickel,



Pumpkin seedlings planted out on windrows of composted biosolids at community compost education garden.

selenium, and zinc. EPA's established standards on pollutant concentrations, pathogen density, and the attraction of potential pathogen vectors (e.g., insects, scavenging mammals, and birds) can be found in the Biosolids Rule (40 CFR Part 503). This regulation requires farmers to monitor these parameters at least once a year and up to 12 times a year, depending on the total amount of biosolids used.¹¹ While heavy metals, pathogens, and disease vectors are regulated, there are a myriad of chemicals, pesticides, and emerging contaminants in biosolids that do not have any regulatory limits.

A recent study conducted by Wu et al. (2012) documents the transfer of pharmaceutical and personal care products (PPCPs) into the tissues of five widely consumed crops, namely peppers, collard, lettuce, radish, and tomato. Drugs and other contaminants enter the sewage system through various pathways, but trace amounts may come from urine or fecal matter or pharmaceuticals dumped down the drain. Therefore, researchers chose three of the most frequently detected pharmaceuticals in biosolids, according to EPA's 2009 Targeted National Sewage Sludge Survey, to study under laboratory conditions: a prescription drug for epilepsy, nerve pain, and bipolar disorder (carbamazepine); an over-the-counter drug for allergic reactions and motion sickness, better known by its brand name Benadryl (diphenhydramine); and an antibacterial agent used in disinfectants and soaps (triclocarban). The treatment group of plants were grown in biosolids-based potting soil and fortified with additional pharmaceutical and personal care

products to ensure detection. Added PPCP concentrations were comparable to those detected in agricultural soils treated with biosolids. All three compounds were found in every one of the studied crops grown in biosolid-treated soils. Triclocarban had the highest root concentration in all the plants, while carbamazepine had the highest above ground concentrations particularly for collards, peppers, and lettuce. Additionally, diphenhydramine was concentrated in the fruits of both the tomato and pepper plants. In other words, pharmaceuticals were found in the edible portions of the plant.¹²

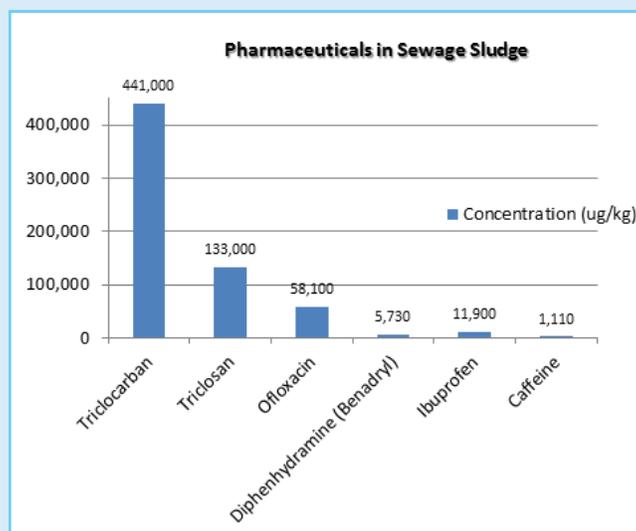
Previous studies had shown that emerging contaminants can be transported into plants in hydroponic systems¹³ and from soils low in organic matter.¹⁴ The above described study demonstrates that the organic matter in biosolids does not prevent the uptake of some emerging contaminants. Finally, the work of Wu et al. (2012) builds on his own research demonstrating that not only are pharmaceuticals taken up by crops, but some are persistent in soils.¹⁵

These studies are largely conducted in the greenhouse and laboratory setting rather than in the field, although one study conducted under normal farming conditions does suggest that PPCPs may be taken up by vegetables grown on biosolid amended soils.¹⁶ More research is certainly needed on plant uptake of emerging contaminants, however, the current results are alarming particularly as the Biosolid Rule only requires pathogen reduction and monitoring for heavy metals.

Antibacterial Pesticides Persist in Biosolids

Because 95% of the uses of the antibacterial pesticide triclosan, and its cousin triclocarban, are in consumer products that are disposed of down residential drains, sewage and wastewater provide a prime medium for their entry into the larger environment. Triclosan and triclocarban are found in high concentrations in biosolids. Triclosan, while not completely removed from water during the treatment process, accumulates in sewage sludge in municipal wastewater systems. After treatment, biosolids are recycled on land, and triclosan can then leach down through the soil and run off into surface water from the fields. Triclosan has been shown to persist in the runoff from treated fields for as long as 266 days after biosolid application and to persist in the sediment for long periods of time. EPA, in its *Targeted National Sewage Sludge Survey Report*, found that triclosan was detected in 79 of a total of 84 sludge samples used in the survey. (See chart).

Triclosan-contaminated biosolids can pose longer term risks to environmental and human health. One study reported that, "The beneficial reuse of digested municipal sludge as agricultural fertilizer represents a mechanism for the reintroduction of substantial amounts of [triclosan] into the environment."²⁰ Subsequently, agricultural lands exposed to contaminated biosolids can leave residues in earthworms, crops, and wildlife. Once in soil, it has been shown that triclosan is in fact taken up and translocated in plants. In soybean plants, triclosan was observed to be taken up from the roots and eventually translocated to the beans.²¹ This suggests that people may also be exposed to triclosan by unknowingly consuming contaminated food.



Among those contaminants of concern include so-called nanomaterials, materials that are engineered at the ultra fine molecular scale that display novel characteristics like increased strength or conductivity. In the study, "Soybean susceptibility to manufactured nanomaterials with evidence for food quality and soil fertility interruption," researchers found that biosolid application to soybeans caused zinc oxide nanoparticles to bioconcentrate in soybean tissues, especially the leaves, and that nano-cerium oxide completely shut down nitrogen fixation. "Juxtaposed against widespread land application of wastewater treatment biosolids to food crops, these findings forewarn of agriculturally associated human and environmental risks from the accelerating use of MNMs [manufactured nanomaterials]," the study finds.¹⁷



User and bystander exposure

Beyond those chemicals that are ingested, the total number of potential health impacts due to contact with contaminants are numerous, ranging from rashes, cough and headaches, to vomiting and nosebleeds. The Cornell Waste Management Institute published a report (2008) that compiled all the health complaints associated with land application of biosolids.¹⁸ Some of the most important impacts include: asthma, allergies, birth complications, congenital defects, respiratory complications and failure, eye problems, gastrointestinal complications, inflammation of the lungs due to irritation caused by the inhalation of dust, alterations in pulmonary function, chronic bronchitis, chronic emphysema, inactive tuberculosis, cardiovascular effects, lesions, nausea, and tumors.

Symptoms, including rashes, have been linked to proximity to agricultural soils treated with biosolids. For example, one study published in 2009, "Interactions of pathogens and irritant chemicals in land-applied sewage sludges (biosolids)," found that 25 percent of residents studied living within approximately one kilometer (0.6 miles) of land application sites were affected by *Staphylococcus aureus* in their skin and respiratory tracts, including two who died. While *S. aureus* infections frequently accompany diaper rash, the effects can be lethal.¹⁹

Biosolid impacts on nature

In addition to extant chemical residues on food crops and direct exposure for applicators and bystanders, biosolids pose significant potential hazards to surrounding ecosystems. Leaching of personal care products, pharmaceuticals, and other classes of micropollutants into local waterways have gained regulatory and scientific scrutiny.²²

Field after application of biosolids at Colorado State University's Biosolids Research site in Byers, Colorado. Photo courtesy CSU College of Agricultural Sciences, Soil Crop and Sciences Dept. <http://biosolids.agsci.colostate.edu>

Soil runoff, fish kills, fresh water eutrophication, and reproductive disruption for aquatic animals are just a few of the potential environmental hazards of biosolids application. One of the most potent impacts occurs as biosolids are washed downstream into waterways and groundwater. Biosolids are rich in phosphorus and nitrogen, which are required for crop growth. Unfortunately, as nutrient rich soils flow into local waters, it stimulates the prolific growth of microorganisms and algae. This algal growth harms the aquatic ecosystem in two major ways: first, algae blocks sunshine, depressing growth of underwater vegetation that fish and aquatic life rely on for food; second, when the blooms die, their decay depletes the dissolved oxygen in the water, slowly suffocating aquatic life. Thus, increasing use of biosolids is not just an aesthetic issue of algal blooms, it poses serious environmental problems.²³

As with human health, environmental health is severely affected by additives that are not removed by wastewater treatment plants. For example, pharmaceuticals like birth control pills have dramatically changed fish reproductive patterns and health. In 2008, researchers reported that minute quantities of estrogens found in the birth control pill alter sperm development by changing the number of chromosomes, which can lead to lower survival and long-term health problems in offspring.²⁴ In 2010, more research reveals that small concentrations of synthetic progesterone-like hormones found in contraceptive drugs, not just synthetic estrogen, threaten fish reproduction.²⁵

As synthetic chemicals are continually being introduced, EPA has not yet worked out a process to regulate these chemicals. Pesticides are only now being identified for testing to determine

whether they are endocrine disruptors, chemicals that interfere with development, hormones, and reproduction through the Endocrine Disruptor Screening Program. In 2007, U.S. Representative Henry Waxman (D-CA) and others harshly criticized EPA for failing to provide a comprehensive endocrine disruptor screening program. In 1996, the *Food Quality Protection Act* (FQPA) required such a program for endocrine-disrupting pesticides to be implemented by 1999: “Today, over ten years after the law was passed and eight years after the FQPA deadline, EPA has not tested a single chemical for endocrine-disrupting effects...,”²⁶ said Rep. Waxman. In 2006, EPA had developed its first draft list of chemicals to be screened by pesticide manufacturers, but included only a portion of 1,700 chemicals identified for screening under FQPA mandate, which is minute compared to more than 75,000 chemicals listed under the *Toxic Substances Control Act*. By 2010, EPA finally released its Endocrine Disruptor Screening Program, which developed Tier 2 tests for endocrine disruptors and implemented draft policies and procedures that the agency will use to require screening.²⁷ Tier 2 testing, however, is still in progress and EPA has not implemented regulations. Meanwhile, the European Union (EU) has already launched its *EU-Strategy for Endocrine Disruptors*, including a comprehensive priority list of chemicals requiring regulation.²⁸

Regulatory pitfalls: A focus on pathogens

Current biosolid regulations

The Standards for the Use or Disposal of Sewage Sludge (Title 40, Code of Federal Regulations, Part 503) was published in the Federal Register on February 19, 1993. This document established a set of general requirements for pollutant limits, management practices, and operational standards for biosolids. It describes the procedure for land application of biosolids, surface disposal, landfilling, and incineration. The EPA Office of Water’s risk assessment of biosolids established limits based on current toxic exposure data, oral reference dose, and human cancer potency values. The analysis compared 14 different chemical exposure pathways and EPA chose the final limits based on the most toxic pathway for exposure.²⁹

The biosolids regulation is based on heavy metal

loading and pathogen concentrations. None of the nine heavy metals may exceed the promulgated ceiling levels. Processes for reduction or elimination of pathogenic bacteria, enteric viruses, and helminth ova must be used. Standards for Class B biosolids require that pathogens are reduced by at least 99 percent, while Class A biosolids require further treatment. Because Class B biosolids still contain traces of pathogens, farmers may only use them if they receive a permit, enforce a buffer, restrict public access, and restrict crop harvesting. Most farmers are required to implement a 30-day waiting period after application to “ensure” the pathogens are killed. For root crops, which come into contact with the soil, the waiting period can be as long as 38 months.³⁰

Pesticide Law and Biosolids

EPA regulates pesticides under the *Federal Insecticide, Fungicide, and Rodenticide Act* (FIFRA), which requires EPA to ensure that pesticides do not pose unreasonable risk to human health and the environment. EPA has interpreted its authority under FIFRA’s “unreasonable adverse effect” standards by conducting risk assessments on pesticides. Unfortunately, EPA’s risk assessment process does not fully take into account the environmental fate and effect of pesticide use and the potential risks of pesticide reintroduction into the environment via biosolids, especially those pesticides that are persistent, and cannot be removed from sludge through treatment outlined in the *Biosolids Rule*. Additionally, pesticide residues which make their way into crops grown in biosolids, contaminate food. These residues must then adhere to standards set by the *Food Quality Production Act* (FQPA), which regulates the residue allowed on crops with tolerance levels. However, pesti-



Biosolids application site in Saskatoon, Canada. After the treatment process, the biosolids are stored in asphalt-lined storage cells until the spring and fall when they are spread on nearby farmers’ fields by a process called liquid injection. Image Courtesy City of Saskatoon, Canada. <http://bit.ly/TKdjSc>.

Branded products that contain sewage sludge/biosolids*

Source: *Sludge News*. 2006. *About Sewage Sludge*. <http://bit.ly/w2n8bh>

- Agresoil (MA)
- All-Gro (Synagro)
- Bay State Fertilizer (Boston, MA)
- Chesapeake Sunshine
- CompostT (Pennsylvania)
- ComPro (Washington, D.C.)
- Dillo Dirt (Austin, TX)
- EarthBlends (New York City, a product of Synagro, sold by WeCare)
- Earthlife (New England, a product of New England Organics)
- EarthMate (Philadelphia, PA)
- EKO Compost (Missoula, Maui, Lewiston plant on Idaho-Washington border)
- Glacier Gold (Olney, MT)
- Granulite (Synagro)
- GroCo (Seattle, WA)
- Growers' Blend by Earthwise Organics (a Synagro subsidiary)
- Hou-Actinite (Houston, TX)
- Kellogg Nitrohumus, Gromulch, Amend and Topper (Kellogg Garden Products, Los Angeles, CA)
- Landscapers' Advantage (Camden, NJ)
- MetroGro (Madison, WI)
- Milorganite (Milwaukee, WI)
- Mine Mix (Philadelphia, PA)
- Miracle-Gro Organic Choice Garden Soil
- Nutri-Green (Virginia Beach, VA)
- N-Viro BioBlend
- N-Viro Soil
- Oceangro (NJ)
- ORGRO (Baltimore, MD, Veolia Water North America)
- SilviGrow (Seattle, WA)
- SoundGro (Pierce County, WA)
- TAGRO (Tacoma, WA)
- TOPGRO (Los Angeles, CA)
- Unity Fertilizer (Unity Envirotech LLC, Florida-based)
- WeCare Compost (NY)

*Sewage sludge or biosolid products can be disguised in many different ways, sometimes it is sold as "compost," while other times it's dried into pellets and bagged, or blended into other fertilizers. There are no labeling requirements for biosolid-containing fertilizers. Additionally, there is no federal rule that prohibits the use of the term "organic" on biosolids, despite the fact that there is no USDA organic certification of biosolids.

cide tolerances have been severely criticized for not being stringent enough, allowing ingested residues to pose short and long-term risks to the human population. Furthermore, ensuring that chemical contamination of crops grown with biosolids does not exceed tolerances requires that such crops be tested regularly for residues. In addition, although food tolerances may cover pesticide residues in foods, they do not affect other avenues of exposure, including inhalation and dermal exposure to dust. Nor do they cover ecological impacts. While the Biosolids Rule provides the guidelines for biosolid treatment, disposal, and reuse, biosolid recycling is a key example of the inadequacies of federal pesticide (and other chemical) risk assessments.

National Academy of Sciences Critique

The regulatory pitfalls are best enumerated in the 2002 biosolid assessment by the National Research Council (NRC) of the National Academy of Sciences (NAS).³⁴ This group reports that there are major data gaps in the science underlying current rules, as well as a lack of epidemiologic studies on exposed populations, and inadequate programs to ensure compliance with biosolid regulations. Under the *Clean Water Act*, EPA is required to review existing bio-

solid regulations every two years in order to identify pollutants that need to be regulated. However, EPA has only researched a fraction of the chemicals that are known to exist in sludge and, of those researched, only some have risk assessments.

While chemical regulations are based on traditional risk-based limits established in the Integrated Risk Information System (IRIS) and the Office of Pesticide Programs (OPP) for human health risks, as yet there are no regulations for chemical pollutants in biosolids, with the exception of heavy metals. By contrast, established pathogenic regulations are based on treatment and site restrictions, completely divorced from traditional risk-based assessments. Instead of explicitly delineating acceptable pathogen risks concentration, EPA developed a risk characterization process that ignores complex chemical-pathogen and pathogen-pathogen interactions that are known to occur. For instance, workers exposed to silica dust (chemical-based) have a higher likelihood of tuberculosis infections (pathogen-based). Such enhanced adverse interactions are not addressed or explored by EPA assessments.

NRC's report, "Biosolids Applied to Land: Advancing Standards and Practices," reflects skepticism over the biosolid assessment process:

"Even if a summary index of the risk of an adverse response to mixtures was available, it would not necessarily reflect the total hazard of exposure to biosolids because of the inability to identify all of its hazardous constituents and their potential for interaction *in vivo*. Moreover, the composition of biosolids is susceptible to unanticipated changes from time to time and place to place. *Thus, it is not possible to conduct a risk assessment for biosolids at this time (or perhaps ever) that will lead to risk-management strategies that will provide adequate health protection without some form of ongoing monitoring and surveillance.*"³⁵ (emphasis added)

EPA's reliance on mathematical estimates of individual pathogens and chemicals ignores secondary transmission potential for pathogens. Currently, only the direct transmission of pathogens is considered, despite the fact that interactions between people and through environmental pathways can cause population-wide

transmission. In summation, NRC concludes that EPA's biosolids risk-assessment and regulatory process is cumbersome and slow, with large information gaps on complex pathogenic interactions, and ignoring important secondary transmission pathways.

In 2003, EPA responded to NAS recommendations by releasing an action plan to determine the potential risks of select pollutants, measure those pollutants, characterize potential volatile chemicals and improve risk management practices. Since then, EPA has released its TNSSS and is in the processes of evaluating 26 of the 49 pollutants identified in the 2009 Biennial Review, including important hormones, antibiotics, PBDEs, and antimicrobials.³⁶ While EPA has identified 31 pollutants as candidates for further regulation during its second round of pollutant evaluation, it has not regulated any of these pollutants that are commonly detected in biosolids. According to the EPA, its action plan has been undermined by "budget constraints and competing priorities within the Agency, [such that] EPA is not able to implement all of the NRC's recommendations."³⁷

The NRC proposed improvements to EPA's risk assessment process, and it proposed monitoring and surveillance as a means of dealing with the uncertainties in assessing risks of complex mixtures, including mixtures of chemicals and pathogens. However, the approach is still one of assessment and management of risks, as opposed to prevention. The NRC identified inherent limitations of risk assessment when applied to mixtures and combinations of chemicals and pathogens, but proposed only a band aid approach. A preventive (or precautionary) approach is more likely to lead to solutions that are truly protective. This approach would ask, "Is there anything we can do differently in order to eliminate problems associated with sewage sludge?" One problem is that the system encourages the mixture of pathogens and toxic chemicals. So, how do we separate the two? What if we created a system in which human "wastes" were composted and the compost used locally? We would still need to establish pathogen requirements and requirements for pharmaceuticals, but we would avoid mixtures with industrial chemicals and lawn pesticides. What if we prohibited the use of toxic pesticides that might get flushed down drains or washed into combined sewers? Creative solutions are possible if we define the problem as avoiding that complex mixture of toxic chemicals and pathogens, rather than searching for a place to put it and a way to make it "acceptable."

Alternative strategies for the future

Biosolid use for energy production

As the discussion around biosolids rages on, innovators have focused on alternatively using biosolids as a renewable energy source, arguing that biosolids can displace fossil fuels for powering waste water treatment plants, reduce dependence on oil, reduce costs for energy and demand on the power supply, and solve



Application site advisory sign. Image courtesy Florida Department of Environmental Protection.

a waste management problem. On the other hand, others believe utilizing biosolids this way is not a solution for fossil fuel dependence, cleaner air, and by extension global climate change. This, too, will require more thorough assessment.

Conclusion

Organic foods: an escape from biosolids

For now, organic certification is the last safe haven from biosolids for consumers. Farms that are USDA organic certified are expressly prohibited from applying biosolids under the National Organic Standards Rule, which ensures that raw foods are grown without hormones or synthetic fertilizers and only approved synthetics in an organic soil-building system. When the proposed Rule first came out in 1997, EPA feared that it would deter new users from using biosolids as a fertilizer and pressed the USDA to exempt biosolids from the ruling. In fact, in 1998, USDA released proposed organic standards that would allow bioengineered crops, irradiation, and sewage sludge in organic production, which became known as the "big three." The release sparked 325,603 mostly horrified public comments. USDA reconsidered and prohibited the "big three" in the final rule.

We know now that biosolids have a complex array of biological pathogens, chemical contaminants, pharmaceuticals, hormones, and emerging contaminants that are not completely eliminated by waste water treatment plants. The land application of biosolids should be abandoned immediately, considering that the current regulatory restrictions and biosolid treatment programs allow for the continuing contamination of the environment and threaten human health. That means we stop using them and stop making them. In lieu of those immediate changes, at the very least, the waste streams for toxic chemicals should be separated from human organic wastes that are applied to agricultural fields.

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Maintaining a Delicate Balance

Eliminating phosphorus contamination with organic soil management

By Drew Toher

To date, 12 states have adopted or implemented laws restricting the use of synthetic phosphorus fertilizers. These new laws are a reaction to serious environmental problems created by an overabundance of phosphorus compounds in aquatic environments. Follow this guide to learn about the source of this problem, and what actions can be taken to protect local ecosystems.

Protecting our Environment from Non-Point Source Pollution

Phosphorus, the middle number listed in the N-P-K (Nitrogen - Phosphorus - Potassium) on the back of commercial fertilizer packages, is a critical nutrient for plant growth and development. However, it is also a major source of non-point pollution in U.S. waterways. Non-point contamination, as opposed to point source pollution from industrial operations, occurs as a result of runoff from diffuse sources moving into rivers, lakes, streams, wetlands or groundwater. Unnaturally high levels of phosphorus in aquatic ecosystems create a cascade of effects that compromise the diversity, stability, and resiliency of the natural environment. High phosphorus loads increase water

turbidity, spur toxic algae blooms, and decrease light penetration. Once algae dies off, aerobic bacteria consume the dead algae, resulting in dangerously low oxygen levels, which further decreases biodiversity and can stress or even kill aquatic wildlife. The increasing frequency of “dead zones” in and around the U.S. is further indication that this environmental problem must be addressed.

The residential use of lawn fertilizers is responsible for a significant amount of this non-point pollution. To help alleviate the contamination this causes in local waterways, states are moving



toward the adoption and implementation of synthetic phosphorus fertilizer bans. In the process, there is considerable misinformation concerning which fertilizers are best for the environment and our overall health. While many in turf management say natural sources of soil nutrients reduce hazardous runoff, the chemical industry claims that the source of phosphorus in a fertilizer is irrelevant, and phosphorus bans should apply to both synthetic and organic sources. However, like many answers to environmental problems, the solution is often found not solely in a product replacement or the preference for one product choice over another, but in the overall management system that protects and nurtures the soil microbial environment.

Phosphorus in soil is not considered a very “mobile” nutrient because soil has a large capacity to retain phosphorus compounds. Consequently, a significant amount of nonpoint phosphorus pollution is a result of soil erosion and over-applications of phosphorus. Preventing soil erosion and performing soil tests should be a focal point for lawmakers and concerned citizens working to stop phosphorus pollution. In this context, the source of a fertilizer is extremely relevant

to these efforts. While organic production methods build a lawn’s capacity to hold soil, synthetic systems weaken this ability. From a holistic soil management perspective, it becomes evident that organic management yields the optimum environmental safeguards, while nurturing healthy plants.

Soil Fertilization: Making Sense of the Different Approaches

The Truly Organic Approach

The goal of an organic production system, whether in agricul-

ture or turf management, is to feed the soil by utilizing methods that build organic matter and encourage microbial diversity. This is achieved through cultural practices such as mowing, aeration, irrigation, and over-seeding, without the use of synthetic inputs such as chemical fertilizers, insecticides, herbicides, or fungicides. To adhere to organic inputs, only fertilizers or soil amendments approved by the Organic Materials Review Institute (OMRI) are guaranteed to comply with the rigorous standards of the *Organic Foods Production Act* (OFPA). (See box on right.)

In building organic matter with compost and other organic nutrients, natural phosphorus becomes mineralized and available to the plant. By breaking down slowly in the soil through beneficial microbial activity, organic fertilization provides turf with a slow release of nutrients throughout the growing season. Gentle increases in the soil's fertility enhance its ability to store nutrients, resulting in decreased runoff, erosion, and leaching of nutrients into groundwater. Organic fertilizers create lush verdant lawns that require less overall maintenance. Additionally, their use ensures that materials of unknown toxicity are not being applied. Developing a holistic organic soil management program will ultimately avoid the contamination problems associated with synthetic phosphorus fertilizers, protecting environmental health.

While OMRI-listed soil amendments are surely the way to go if soil needs a phosphorus correction, even they can cause environmental problems if over-applied. Therefore, a soil test and close adherence to application recommendations are required. Note that all states exempt compost from their phosphorus bans, with an understanding that the judicious use of it, compost/manure tea, or grass/leaf mulches as top dressings for maintenance purposes should not be a problem. However, proper care is important with the use of dried or pelletized natural fertilizers. They must be applied to the lawn at the rates recommended by a soil test. For more detailed information on managing lawns organically, see Beyond Pesticides factsheet: bit.ly/RTGalv.

“Organic”/ “Natural” Fertilizers

OMRI and the OFPA

OMRI (Organic Materials Review Institute), is an independent non-profit organization that evaluates fertilizers in accordance with current National Organic Standards. Look for the “OMRI Listed” label to ensure that a product contains natural materials and/or synthetically derived micronutrients reviewed and allowed by the National Organic Standards Board. OMRI products must follow legal guidelines under OFPA [7 U.S.C. 6508], which state, “For a farm to be certified...producers on such farm shall not – 1) use any fertilizers containing synthetic ingredients or any commercially blended fertilizers containing materials prohibited under this title or under the applicable state organic certification program; or 2) use as a source of nitrogen: phosphorus lime potash or any materials that are inconsistent with the applicable organic certification program.”

Unlike the USDA organic symbol that can be found on food products, “organic” and “natural” claims on packaged lawn care fertilizers are not subject to the requirements of OFPA. These labels can be misleading because state and federal laws do not regulate “organic” or “natural” claims in fertilizers. For a fertilizer package to include these words, the product is only required to contain natural carbon, meaning these products could still include toxic and persistent chemicals, excessive heavy metals, personal care products, or residual pharmaceuticals. When in doubt, read the product's label.

Avoid “natural” and “organic” products with the following components that can make their way into environment and harm native species:

- *Biosolids*: Biosolids, or sewage sludge, are dried microbes

The Package Says “Organic” . . . But, It’s Biosolids. What’s Up with That?

With the growth in organic farming, the number of packaged fertilizers marketed to organic farmers has also grown. Fertilizer labeling laws are enacted state-by-state in the United States. The regulators of fertilizer labeling laws are organized through the Association of American Plant Food Control Officials (AAPFCO). Most states follow the AAPFCO model language, which defines organic fertilizer as [a] material containing carbon and one or more elements other than hydrogen and oxygen essential for plant growth (AAPFCO, 2008). This definition permits fertilizers to be labeled as “organic” even if they do not necessarily comply with the USDA National Organic Program (NOP) standards to produce organic food. As a result, sewage sludge, urea, and blended fertilizers that contain organic matter and a variety of synthetic fertilizers that contain some carbon may bear the organic term but will result in the loss of the NOP certification of an organic field for three years, if applied. There is a tentative definition for organic input that more closely follows the NOP standard. However, that tentative definition has not yet been adopted by most states, coordination of state officials with USDA and certifiers will be a challenge, and the other conflicting uses of the word organic on fertilizers are expected to continue to cause confusion for farmers and the public.



This image, captured in October 2011, shows one of the worst algae blooms that Lake Erie has experienced in decades. Photo Courtesy NASA.

originally employed to process municipal wastewater. These products, particularly “Class B biosolids,” have been found to contain pesticides, detergents, estrogenic hormones, dioxins, PCBs, and heavy metals - all of which can leach into groundwater or be taken up into plants. They can also contribute to antibiotic resistance in bacteria on fields that have had biosolid fertilizer applications. Moreover, a 2002 study revealed a high prevalence of *Staphylococcus aureus* infections in residents that lived within close proximity to biosolid treated agricultural fields due to exposure from blowing winds.

- **Synthetic Chemical Wetting Agents:** Forgo purchasing any product that markets itself as organic, yet contains a synthetic wetting agent. These products, also known as soil surfactants, can contain compounds which EPA considers carcinogenic. If the label doesn't list the chemical makeup of the wetting agent, avoid that product.
- **Products with Inert Ingredients:** Avoid any “natural” products that don't list all of their ingredients. These products could be formulated with toxic synthetic chemicals, and it's always good practice to know what you're applying around your home.

The conventional, chemical approach

Synthetic fertilizers should be avoided due to the multitude of adverse environmental effects that result from the use of these chemicals. Applying synthetic fertilizers to a lawn pumps nutrients into the soil faster than the turf can absorb them, resulting in much of the groundwater leaching and runoff detrimental to aquatic environments. Excessive applications of synthetic fertilizers also cause microbes in the soil to go into a feeding frenzy, devouring all the available carbon material they can find. Continuous

applications of these fertilizers exhaust soil life, leading to barren, sterile land. Dry, compacted, hardpan soil is the result of, in part, decreased microbial activity and these salt-based synthetic chemicals. These soils produce coarse, patchy lawns, which require more water to maintain, and erode quickly. Sterile soil also reduces a plant's ability to ward off disease and pestilence, increasing dependency on toxic pesticides.

Petroleum and natural gas are basic feedstocks that are used in large quantities in the production of synthetic fertilizer, which is an integral part of the pesticide treadmill in chemical intensive agriculture and land management. The dependency on these non-renewable resources, with the known hazards associated with extraction, processing and refining, leads to environmental contamination that adds to the identified adverse effects associated with synthetic fertilizer use. The synthetic N-P-K approach to fertilization brings with it distinct

production and use hazards that are associated with each of these ingredients, and overall is a significant contributor to greenhouse gas emissions, water contamination, and adverse impacts on wildlife and human health.

States Act to Protect Natural Resources

In the absence of overarching federal regulations, states are acting unilaterally to address their phosphorus problems. Twelve states, including Illinois, Maine, Maryland, Michigan, Minnesota, New Jersey, New York, Vermont, Virginia, Washington, Wisconsin and Florida (which only requires select counties to participate) enacted laws within the last five years that restrict the residential and commercial use and sale of phosphorus-containing fertilizers. Connecticut and Pennsylvania are currently considering legislation.

In general, these laws prohibit phosphorus fertilizer applications unless they are used to establish or repair new turf, or cure a lack of phosphorus based on a soil test. Several states also restrict the use of these fertilizers within a certain proximity to a body of water, and on impervious, frozen, or saturated surfaces. Many state laws exempt from the ban agricultural land, commercial or sod farms, golf courses, or gardens.

While the state laws are right to restrict phosphorus use leading to contamination, Beyond Pesticides does not find any of the adopted state laws to be adequate in eliminating dependency on synthetic fertilizers that are not needed, or are not essential, to meet fertility requirements. As a result, Beyond Pesticides urges the discontinuation of their use, given the range of environmen-

Table 1. Comparing States' Phosphorus Lawn Fertilizer Bans

(Source: Kristen Miller, Office of Legislative Research, Connecticut General Assembly, <http://www.cga.ct.gov/2012/rpt/2012-R-0076.htm>)

State	Year Passed/ Effective Dates	Exempt Applicators and Allowed Phosphorus Fertilizer Uses	Compost and Un-processed Manure Exempt?	Processed (Pettetized) Organic Fertilizers Exempt?	Application to Paved or Impervious Surfaces	Setbacks from Water (Buffer Zones)	Application to Paved or Saturated Soils	Restrictions on Phosphorus lawn fertilizer sales
Beyond Pesticides' Ideal Phosphorus Ban		No exemptions for synthetic phosphorus fertilizer applications.	Yes, but sewage sludge not exempt	Yes, but only if OMRI certified	Prohibited	25 ft	Prohibited	Sale of synthetic lawn fertilizer prohibited. Post educational signs around nonsynthetic fertilizers explaining environmental problems with synthetic fertilizers and how the alternatives work in an organic system.
Illinois	2010/2010	Golf courses; Commercial and sod farms; Agricultural lands and production; Right-of-ways; Phosphorus deficiency; Establish new turf; Lawn repair.	Yes	Yes	Prohibited, must clean up if inadvertent	3 to 15 ft	Prohibited	No restrictions
Maine	2007/2008	Agriculture; Phosphorus deficiency; Establish new turf; Sod farms; Turf repair; Gardening.	Yes	No	No restrictions	None	No restrictions	Post signs about fertilizer use at point of sale.
Maryland	2011/ 2011-2013	Agricultural purposes; Commercial and sod farms; Phosphorus deficiency; Establish new turf; Turf repair.	Yes - But only if a soil test indicates it is necessary	No	Prohibited	10 to 15 ft	Prohibited from Nov. 16 to Feb. 29 or on frozen ground	Must sell low phosphorus fertilizer for lawns unless organic and sold to professional.
Michigan	2010/ 2012	Golf courses; Commercial farm land; Phosphorus deficiency; Establish new turf.	Yes	No	Must clean up if applied	3 to 15 ft	Prohibited	No restrictions
Minnesota	2002/ 2004	Golf courses; Sod farms; Agricultural lands and production; Phosphorus deficiency; Establish new turf.	Yes	No	Prohibited, must clean up if applied	None	No restrictions	No restrictions
New Jersey	2010/ 2011, 2013	Golf courses; Commercial Farms; Phosphorus deficiency; Establish new turf; Turf repair.	Yes	Yes- but only if it contains no more than .25 pounds of phosphorus per 1,000 square ft.	Prohibited, must clean up if inadvertent	10 to 15 ft	Prohibited during heavy rain or when predicted, on saturated or frozen ground, or from Nov. 16 - Feb. 29 (Dec. 2 - Feb. 29 for professionals)	Sale prohibited to consumers unless for deficiency, new turf, or turf repair.
New York	2010/ 2012	Gardens; Agricultural lands and production; Sod farms; Phosphorus deficiency; Establish new turf.	Yes	No	Prohibited, must clean up if applied	3 to 20 ft	Prohibited between Dec. 1 and Apr. 1	Display phosphorus fertilizer separately; Post educational signs.
Vermont	2011/ 2011, 2012	Golf courses; Sod farms; Agricultural lands and production; Phosphorus deficiency; Establish new turf.	Yes, but sewage sludge not exempt	Yes	Prohibited, must clean up if applied	25 ft	Prohibited from Oct. 16 to Mar. 31 or on frozen ground	Display phosphorus fertilizer separately; Post educational signs.
Virginia	2011/ 2013	Golf Course Management plan; Phosphorus deficiency; Establish new turf; Turf repair; Agricultural use.	Yes	Yes	Package label prohibits certain uses	None	Package label prohibits certain uses	Sale of lawn maintenance fertilizer prohibited; Can sell existing stock.
Washington	2011/ 2013	Establish new turf; Turf repair; Phosphorus deficiency; Gardens; Sod farms; Agricultural land or production.	Yes, but sewage sludge not exempt	No	Prohibited	None	Prohibited on frozen ground	Sale prohibited unless for an allowed use and properly labeled; Can sell existing stock.
Wisconsin	2009/ 2010	Sod farms; Agricultural land and production; Phosphorus deficiency; Establish new turf.	Yes	Yes	Prohibited, must clean up if inadvertent	None	Prohibited on frozen ground	No display but may post sign; Must sell only for specific purposes.

tal problems associated with its production and use, and seeks the adoption of organic soil fertility practices that provide an environmental benefit. A comparison of the state policies are contained in Table 1 (on the previous page). As a part of the adoption of state law phasing out synthetic fertilizers, Beyond Pesticides urges states to work with retailers to provide consumers with point of purchase information on sound organic soil fertility practices and products that are protective of the environment.

Do These Laws Work?

Until recently, there was no proof that these bans would have much of an impact on the health of aquatic environments. However, a 2011 study following the effects of a phosphorus ban by the town of Ann Arbor, Michigan supplied critical evidence of the policy's effect. The study, entitled "Reduced additions to river phosphorus for three years following implementation of a lawn fertilizer ordinance," published by researchers at the University of Michigan in *Lake and Reservoir Management*, revealed average decreases in soluble-reactive phosphorus by upwards of 52%, dissolved phosphorus by 35%, and total phosphorus by 25% in the Huron River compared to an upstream control group. Researchers concluded, "The jurisdiction of Ann Arbor, Michigan, seems to be contributing less nonpoint source P to the Huron River than it did before implementation of its lawn fertilizer ordinance." Peer-reviewed evidence of the effectiveness of these fertilizer bans affords policy makers with the scientific basis to implement these regulations.

What You Can Do

While the application of phosphorus fertilizers is common as a means of feeding nutrients to plants, organic approaches use cultural practices and soil amendments to feed the soil, and as a result create an adequate amount of plant-available phosphorus. Individuals can reduce their impact on local waterways and aquatic wildlife by following some simple guidelines:

- *Get a Phosphorus Ban in Your Community* – Organize a local coalition of environmental health advocates and policy makers. Contact Beyond Pesticides for organizing information and a copy of our model policy.
- *Prevent Soil Erosion* – Preventing soil erosion keeps phosphorus from entering local rivers, lakes, and streams. Mulch bare soil with straw or wood chips, and edge your yard with native trees and shrubs to prevent the loss of topsoil. Also, be careful not to over-water your lawn.
- *Only use phosphorus based fertilizers on your lawn if a soil test indicates it's necessary* – Test your lawn every 2-3 years. If your soil test does indicate a phosphorus deficiency, make sure to follow application instructions from your extension office carefully in order to avoid over-fertilization. Although



Helpful Tip!

Save money and maintain your lawn with real natural, organic fertilizers by mulching it with grass clippings and/or shredded leaves. You can also turn your food scraps into fertilizer by starting a worm bin or traditional compost pile. See Beyond Pesticides factsheets on Starting a Compost Pile and Making Compost Tea for more information, available online at <http://bit.ly/120W5Ty>.

phosphorus is not a highly "mobile" nutrient, soils already saturated with phosphorus are more prone to groundwater leaching and contamination of local waterways. When fertilizing is necessary, be sure to use non-synthetic sources of phosphorus, as it breaks down slower and supplies nutrients to your lawn over a longer period of time.

- *Keep fertilizer, leaves, and grass clippings off of impermeable surfaces and on your lawn* – When left on impermeable surfaces, these materials have a greater chance of running off into local waterways where they degrade and contribute to excessive nutrient loads. When applying phosphorus fertilizers, try to incorporate them into your lawn's soil. Leave grass clippings on your lawn as mulch to ensure the nutrients already in your soil are recycled for future plant growth. Never apply fertilizer to frozen ground.
- *Fertilize away from ponds, rivers, lakes, and streams* – Be careful when applying fertilizers near water. Create a buffer of at least 25 ft. in order to minimize runoff. Additionally, keep an eye on the weather forecast in order to prevent applying fertilizer before a heavy downpour, as heavy rain can cause recently applied fertilizers to runoff before being incorporated into the soil.
- *Pick up after your pet* – Picking up pet waste helps prevent further contamination of local waterways and also protects public health.
- *Keep a healthy lawn* – By maintaining a healthy lawn through proper care, you can cut down on your overall fertilizer needs. Beyond Pesticides Lawns and Landscapes webpage has all the information you need to maintain a healthy lawn.

Rodenticides, Hazardous to Children, on Their Way Out

Despite non-toxic alternative controls, chemical industry fights to retain toxic chemicals

by Xoco Shinbrot

After more than a decade of research, review and revisal, the U.S. Environmental Protection Agency (EPA) is slowly moving toward the final step in canceling and restricting poisonous rodenticide products that have been shown to poison wildlife (including endangered species), pets, and children. Even though EPA has found the number of exposure incidents resulting in symptomatic diagnoses and/or requiring treatment to be unacceptably high, officials in the past have hesitated to take regulatory action, but are now poised to act.

A young mother puts out two blocks of rat poison. Two hours later, her toddler starts vomiting and his stool is colored bright green. Later, she finds the remains of a container that held rat poison behind the family's television.

This scene has been a regular occurrence in American homes since rodenticides became commercially available. EPA has known for decades that thousands of children each year are exposed to these super-toxic poisons used to kill rodents. In 2009, approximately 40,000 children were exposed to rodenticides (blocks, granules, pellets and powder), and the majority of calls to poison control centers concern children under the age of three. Children poisoned by ingesting rodenticide products can suffer internal bleeding, coma, anemia, nosebleeds, bleeding gums, bloody urine and bloody stools. Many are anti-coagulants, chemicals that prevent blood from clotting or coagulating. Manufacturers have also stood by outmoded formulations and technologies that give children and pets easy access to these poisons. The brand names still available on the market but slated for cancellation include d-CON Mouse Prufe, Hot Shot Sudden Death, Rid-a-rat, and Generation Meal Bait Packs. While EPA now is moving to restrict household use of these rodenticide products, legal and lobbying efforts by the multinational corporation that sells d-CON products is working to stop the agency from moving forward. Despite this, EPA has made it known that it intends to finalize this important rulemaking. The final cancellation order is expected in early 2013.

Children Poisoned

The rodenticide products identified by EPA for cancellation pose significant risks to human health. Children are particularly susceptible to accidental poisoning because they tend to play on floors and

explore by putting items in their mouths. According to the 2010 Annual Report of the American Association Poison Control Centers' National Poison Data System, there were over 40,000 cases of children six years and younger who experienced exposure to rodenticide products. Of those, 10,227 were from anticoagulant rodenticides. Data from New York City's Department of Health and Mental Hygiene also indicate that between 2000 and 2010, of a total of 4,250 unintentional exposures to rodenticides, 79% were children less than six years old.

Exposure to these poisons can have long-term health effects. For example, coumatrin, an anti-coagulant, has been shown to cause paralysis due to cerebral hemorrhage and is teratogenic (causes birth defects). Long-term exposure to the indandione diphacinone

d-CON
Mouse-Prufe® II
KILLS MICE

Good Housekeeping
Promises
Satisfaction in Every Product

MULTI-PACK
4
Packs of
Mouse Prufe® II

Keep out of reach of children.
CAUTION:
May be harmful or fatal if swallowed.
Read additional precautionary statements on back panel.

NET WT. 6 OZ. (170g)

ACTIVE INGREDIENTS:
Brodifacoum 3-[3-(4'-bromo-(1,1'-biphenyl)-4-yl)-1,2,3,4-tetrahydro-1-naphthalenyl]-4-hydroxy-2H-1-benzopyran-2-one.....0.005%
INERT INGREDIENTS.....99.995%
TOTAL 100.000%

NET CONTENTS 4/1.5 OZ.

House Mice may consume a lethal dose in one feeding with first dead mice appearing 4 or 5 days after feeding begins

D-CON is one of the brand names that has challenged EPA's cancellation and is actively lobbying to stop the agency from moving forward. Despite these efforts, EPA intends to proceed. It is still legal to sell these products on the market until the final cancellation order is issued in early 2013.

causes nerve, heart, liver, and kidney damage as well as damage to skeletal muscles.

Secondary Exposure Risks to Wildlife

Beyond the known health risks at home, there is strong evidence that pets and wildlife are being poisoned due to secondary exposure to rodenticide baits. Federally listed threatened and endangered species, such as the San Joaquin kit fox, Northern spotted owl, and the bald eagle have suffered lethal effects from these rodenticides, either through direct or indirect contact. Rodents, which can feed on poisoned bait multiple times before their death, contain residues that may be many times the lethal dose. Additionally, poisoned rodents make easy prey for predatory birds and other wildlife as well as for carrion predators, ensuring that many of these rodents are caught and consumed, leading to secondary poisonings. According to EPA, secondary dietary exposures for birds from the rodenticides brodifacoum and difethialone exceed levels of concern.

Regulatory Action

Over the past decade EPA has struggled to protect people, especially children, and wildlife from exposure to toxic rodenticides. In 1998, EPA safety regulations, which required manufacturers to include an ingredient that makes the poison taste bitter and a dye that would make it more obvious when a child ingested the poison, was revoked in 2001 after EPA announced that a “mutual agreement” was reached with the chemical manufacturers. In short, some pesticide manufacturers thought putting a bittering agent into the poisons deter rodents from eating the product. In response, the Natural Resources Defense Council (NRDC) and the West Harlem Environmental Action (WE ACT) filed a lawsuit in 2004, challenging EPA’s regulations as unprotective of children.

In 2007, EPA proposed a requirement that all over-the-counter rodenticides sold for residential use be available only in tamper-resistant bait stations to reduce the incidents of accidental exposure to children. Then, in 2008, EPA issued its risk mitigation decision requiring rodenticide manufacturers to adhere to four primary requirements:

1. Rodenticides marketed to consumers must be sold as a block

or paste bait, banning the sale of granular and pellet formulations.

2. Rodenticide baits stations sold over the counter may carry no more than one pound of bait, and only in bait stations designed to keep out children and pets.
3. Highly toxic second-generation rodenticides are prohibited from the retail market, particularly anticoagulants, brodifacoum, bromadiolone, difenacoum and difethialone.
4. Professional exterminators and employees of farms and businesses may continue to use loose baits and more toxic rodenticides.

Since then, three manufacturers still market products that are not in compliance with EPA standards: Reckitt Benckiser LLC, makers of D-Con rodent control products; Spectrum Group Division of United Industries Corporation, makers of Hot Shot and Rid-a-Rat rodent control products; and, Liphatech Inc., makers of Generation rodent control products (See Table 1).

Manufacturer Decry EPA’s Decision

EPA is within a hair’s breadth of issuing a final cancellation, but recent comments by manufacturers, most notably Rickett Benckiser, have indicated that industry will challenge EPA on its decision. While evidence shows (and EPA agrees), that these 20 rodenticides pose environmental and public health risks, Reckitt Benckiser is adamant that EPA has failed to address additional areas of interest, including the potential impact the cancellation could have on low income and minority populations, as well as the benefits that these rodenticides may provide users against infestation, disease propagation, and property destruction.

Rodenticides Disproportionately Impact Low Income Groups

Rickett Benckiser argues that regulation preventing the use of their product could have a significant impact on low income and minority populations. Certainly, from a poisoning perspective this is true. Black and Hispanic children living below the poverty line are disproportionately affected. For example, a study in New York found that 57 percent of children hospitalized for eating rat poison from 1990 to 1997 were African-American and 26 percent were

Typical Rodenticide Products

Rodenticides can be broken down into three categories—baits, tracking powders and fumigants. Both baits and tracking powders are rodent poisons in the traditional sense. They must be eaten to kill the pest. Baits are designed to attract the rodent to a feeding station. Tracking powders are placed along rodent runways in and around buildings, picked up by the fur as the animal passes by, and then ingested during grooming. Fumigants are poisonous gasses, designed to kill rodents in their burrows.

Multiple feed baits are the most commonly used type of rodent poisons. Typically these poisons act as anticoagulants, literally causing the rodent to bleed to death internally. The fact that these poisons must be made available to the rodent over time makes them very hazardous, as children, pets and other non-target animals have an extended opportunity to get to them.

Latino. However, low income and minority populations are also the least financially prepared to deal with the unintended consequences of rodenticide poisonings and exposure, considering the rising costs of health care. Considering the impact to low income populations, children, and wildlife, EPA has the responsibility to restrict poisonous and dangerous rodenticides.

Defined IPM Is the Safer Alternative to Managing Rodents

As EPA moves toward cancellation of the rodenticide products in the residential setting, the adoption of practices not reliant of poisons that hurt children and the environment are key to the agency’s registration review. One unintended consequence of restricting these rodenticides could be their replacement with another toxic chemical, bromethalin. Bromethalin, unlike anticoagulants, has no antidote and the treatment, which uses corticosteroid, is unreliable, as symptoms often return. Bromethalin works by disrupting ATP production, which impairs cellular ability to control osmosis. This damage can cause paralysis, convulsions and death. Substitution of anticoagulants for yet another toxic agent like bromethalin would be indicative of the failure of U.S. pesticide regulation to advance least-toxic methods.

Consumers must be aware that using toxic rodenticide products is not a long-term healthy solution to controlling rodent populations. Defined integrated pest management (IPM) is a low cost strategy that eliminates the need for any hazardous rodenticides by focusing on preventing rodent infestations. For instance, by always cleaning up food and food areas, placing food in airtight, sealed containers, disposing of food and food wrappers in sealed garbage containers, repairing leaky pipes and faucets, caulking up cracks and crevices, and eliminating clutter whenever possible, residents can effectively eliminate food and water sources and prevent infestations. For outdoor rodents, the key is to modify habitat and decrease food sources to help keep populations under control.

Sanitation, structural repairs, mechanical and biological control, pest population monitoring are prioritized IPM methods that improve rodent control.

Take Action

The public concerned about protecting the health of children must be heard. When chemical companies do not get the response they want from regulators enforcing law to protect health and the environment, they often seek a political solution by running to Congress to try to force regulators to back off. That is what is happening here.

We must let EPA protect children, as the law requires, and recognize that there are methods and products available that can manage rodents without poisoning children. Here

is how you can help:

1. Support EPA’s decision to cancel. Visit Beyond Pesticides Take Action page and send your letter of support. bit.ly/UXSy2f
2. Contact your member of Congress and let them know that EPA must move forward with the cancellation of these products in order to protect public health, especially children. Ask them to write a letter to Administrator Lisa P. Jackson, EPA to support the agency moving forward.
3. Tell your friends and family not to purchase the rodenticide products not in compliance with EPA’s decision (See Table 1).

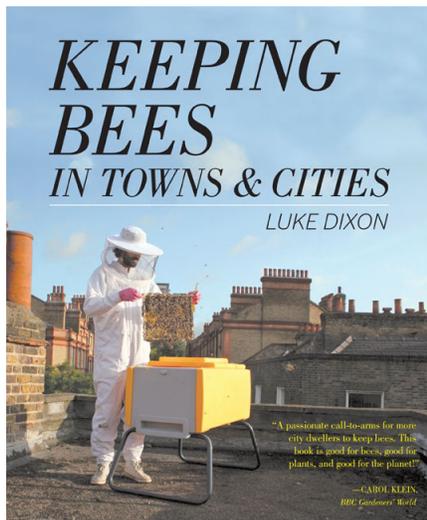
Table 1. Products Proposed For Cancellation

Manufacturer	EPA Registration Number	Product Name
Reckitt Beckiser LLC	3232-3	D-CON CONCENTRATE KILLS RATS & MICE
	3282-4	D-CON READY MIXED KILLS RATS & MICE
	3282-9	D-CON MOUSE PRUFE KILLS MICE
	3282-15	D-CON PELLETS KILLS RATS & MICE
	3282-65	D-CON MOUSE PRUFE II
	3282-66	D-CON PELLETS GENERATION II
	3282-74	D-CON BAIT PELLETS II
	3282-81	D-CON READY MIXED GENERATION I
	3282-85	D-CON MOUSE-PRUFE III
	3282-86	D-CON BAIT PELLETS III
	3282-87	D-CON II READY MIX BAITBITS III
	3282-88	D-CON BAIT PACKS III
Liphatech Inc.	7173-247	GENERATION MEAL BAIT PACKS
	7173-283	DIFETHIALONE BAIT STATION
	7173-285	DIFETHIALONE 6G PASTE PL PKS
Spectrum Group Division of United Industries Corporation	8845-39	RID-A-RAT RAT & MOUSE KILLER
	8845-125	HOT SHOT SUDDEN DEATH BRAND MOUSE KILLER
	8845-126	HOT SHOT SUDDEN DEATH BRAND RAT KILLER 1
	8845-127	HOT SHOT SUDDEN DEATH BRAND RAT & MOUSE KILLER
	8845-128	HOT SHOT SUDDEN DEATH BRAND MOUSE KILLER BAIT STATION

Keeping Bees In Towns & Cities

Luke Dixon, *Timber Press, London, 2012, 183pp. \$19.95.*

"[T]here can be few better ways to maintaining a connection with the natural world than by keeping a hive in the middle of the city," according to the author of a short book about urban beekeeping, Londoner Luke Dixon. Mr. Dixon is a professional beekeeper living and raising bees in Soho, London. He manages hives for the London College of Fashion, Kensington Palace, among others, as well as keeping his own hives at London's Natural History Museum. As a theater director, he began as a hobbyist beekeeper.



Mr. Dixon wrote this book, filled with pictures of urban beehives and beekeepers, as we are experiencing a renaissance in urban beekeeping. In the last century, London, like many cities, has seen a reduction in the number of managed hives from one million to 250,000. That is now turning around with an increased excitement in urban beekeeping worldwide. "It has been the decline of the honey bee and our increasing awareness of our dependency on it that has been in large part responsible for the growing twenty-first century interest in bees and beekeeping," says Mr. Dixon. New York City's repeal of a ban on beekeeping in Spring of 2010, along with other jurisdictions across the country is part of this trend.

As Mr. Dixon met with London beekeepers, he found hives in small spaces —"wedged onto balconies on council flats, outside French windows in minuscule Victorian gardens, and perched on roofs." He says, "It was clear that if you have room for a composter or a water barrel, you have room for a beehive." What's needed is enough space for the footprint of the hive and for the beekeeper to work. Rule of thumb for the bees: two hives for an acre of forage. The bees will find the pollen and nectar and sources of nearby water. Mr. Dixon, with a beekeeper mentor, set up his hives in a small garden and that winter had a kitchen full of jars of honey and the garden had more berries on its holly trees. The book, while not a detailed manual, provides a great overview and tips for getting started in beekeeping and maintaining hives, finding a spot that enables easy access to the hives and faced away from humans (pathways, windows, children playing) so bees can fly in and out undisturbed.

The book includes a short history of humans' relationship to bees,

starting before humans decided to "keep" bees, but as harvesters of wild nests for honey and wax. This raiding of the nests resulted in the destruction of the hives, as did the first built hives that replicated those in the wild. The "modern" Langstroth hive, named after its creator Rev. Lorenzo Langstroth from Massachusetts in 1851, encourages bees to build their nests on movable frames, allowing honey extraction without destroying the hives. There are numerous variations on this structure. The author takes readers through his planning process, from identifying a location, choosing the type of beehive, assembling it, buying bees (he suggests making sure that the bees have

a temperament that is suited to the urban environment; bees that are gentle and healthy), getting protective clothing and other equipment, harvesting honey, and winter beekeeping.

"For me, keeping bees has become a perfect hobby, a quiet and meditative escape from a hectic life. . . It has made me more in tune with the weather and the seasons, aware of the days shortening and lengthening, and alert to flowers and blossoms that I had passed without thought for years," writes the author. The book contains a lot of advice and perspective from the viewpoint of a novice —such as controlling swarms, or what to do when a swarm occurs, with facts like, "Swarming bees are at their most docile," and can be easily scooped up and taken away.

"If you have dandelions on your lawn, try to leave them for the bees."

The chapter, "The Nectar Garden," explains the foraging (a honey bee will visit from 100 to 1,000 flowers on every flight away from the hive and make 20 flights a day) and the

author emphasizes that, "Planting for bees, even if you are not a beekeeper yourself, is an important task. And you don't necessarily have to plant," he says, if you let the dandelions grow.

The book ends with a section called "Reports from the Field," which includes 23 stories of beekeepers across the U.S., Canada, Europe, Africa, Asia, and Australia. It is a fun part of the book with the influences of geography, culture climate, and experience.

Beyond Pesticides is working to protect pollinators and advance the practices and policies that recognize that the nurturing and protection of bees is essential to the production of food and flowers. See our Pollinator and Pesticides page at www.beyondpesticides.org and join our campaign to save the bees.

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