Pesticides and You

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

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No Longer a BIG Mystery

Recent scientific research confirms

the role of pesticides in pollinator decline

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Challenges and a Breath of Fresh Air

There continues to grow a confluence of issues that threaten long-term sustainability of the planet, with domesticated and wild bees and beneficial organisms in decline, and environmentally-induced diseases threatening people's health. While Beyond Pesticides emphasizes the strategies for advancing ecological approaches that rebuild and renew the environment, as an organization we believe it is critical to understand the science and politics that allow toxic pesticide dependency to continue to cause harm, unnecessarily.

A Confluence of Challenges

This issue of *Pesticides and You* was written as a number of challenges began to come into focus. Understanding these challenges will help us to recognize the urgency with which we must approach solutions in our communities and through the political process. Over the last several months, we have seen: (i) Congress overturn an important health-based decision by EPA to take sulfuryl fluoride out of our food supply after the National Academy of Sciences and the Centers for Disease Control and Prevention found that the hazards from water exposure alone are too high; (ii) USDA propose allowing genetically engineered 2,4-D-tolerant crops on the market despite data from its own scientists that find this will significantly increase use of an herbicide that contains a dioxin contaminant linked to cancer, endocrine disrupting, reproductive, and neurological effects; and (iii) Congress reject an amendment in the Farm Bill that would have taken some relatively small steps to advance interagency coordination and research to protect pollinators with a greater sense of priority, at the same time that the science linking a decline in pollinator health is filling the pages of scientific journals.

I am reminded when issues like this come together that we have within reach alternatives that can undo the kinds of problems being reported in this issue. Clearly, complacency and deference to officials does not work. We can't sit back and wait for federal or state governments to protect health and the environment. We can, however, take steps within our own homes, in the marketplace, and through local governments to effect change now. Those following the decades of work at Beyond Pesticides know that the organization has strategically advanced organic standards as the solution to pesticide hazards, with careful attention to an ecological-based approach to agriculture and land management that respects nature, builds and improves soil health, and removes toxic threats to air, water, and land.

Reminder: Save Our Organic www.beyondpesticides.org/SaveOurOrganic

The key to the growth of the organic sector has been the building of public trust in an organic food label that is backed by a rigorous public decision making process that is protected from the kind of politicized decision making that often invades government standard setting. As reported in the last issue of *Pesticides and You*, USDA has moved to dramatically change the public process and the authority of the National Organic Standards Board (NOSB), which was set up by Congress to have independent authority over the allowed substances in organic systems, with recognition that environmental, farm, and consumer interests cannot be ignored in the decision making process. This, too, is on the chopping block, as USDA seeks to control the NOSB process of review, workplans, and ability to issue advice on key issues related to organic integrity. Don't forget that the process USDA is seeking to overturn removed an antibiotic from organic apple and pear production, took synthetic ancillary nutrients out of organic soy infant formula, set a moratorium on nanotechnology in organic products and packaging, and more is now threatened. On March 14, we launched our *Save Our Organic* campaign to call for a moratorium on the USDA policies that undermine the transparent organic standard setting process. Please go to www.beyondpesticides.org/SaveOurOrganic to make your voice heard.

New Farmworker Protection Proposed

EPA announced in February proposed revisions to its 20-year old farmworker protection standard, which has been criticized as woefully inadequate in protecting the health of agricultural workers. The new standards will increase training, improve notification of pesticide application, and increase the minimum age requirement for children to work around pesticides. An omission in this new EPA proposal, which was requested in a 2011 petition by farmworker organizations, is medical monitoring of agricultural workers and handlers who regularly handle Toxicity Category I and II organophosphate and n-methyl carbamate pesticides. This was specifically highlighted in the petition because of its importance to worker safety. EPA does not believe that the anticipated benefits of a monitoring program would justify the costs to handlers and employers. Another request by farmworker advocates that is not included in these new revisions is the provision of contact information on legal representation as a part of worker and handler training, should the worker need legal redress. Agricultural justice is an essential component of a sustainable food production system.

Takoma Park, MD Launches Model for Organic Lawns

Restricting turf and landscape pesticides in Takoma Park, Maryland is a breath of fresh air among the challenges. To implement the City of Takoma Park ordinance passed last year, officials launched a webpage (www.takomapark.gov/safegrow) that provides key information on the law and organic practices. The information implements the *Safe Grow Act*, which prohibits hazardous pesticides listed on the webpage and provides the technical information on practices and products to be successful. The webpage teaches residents to transition to organic practices, start a new lawn, and work with service providers. A great way to welcome Spring!

Jay Feldman is executive director of Beyond Pesticides.

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Soil Contamination

Beyond Pesticides,
I recently found articles that discussed golf courses and endocrine disruptors. Being an expert on these topics, I would like to ask Beyond Pesticides a question.

Given a decades old golf course where routine maintenance was performed, would the soils be polluted to the point where no one should attempt to grow vegetable gardens on that land?
-John

Hi John,
This is always a difficult question to answer in the abstract. Although golf courses tend to be among the land areas most heavily treated with pesticides, the range of chemical uses and the amount of use on different parts of the course (greens, fairways, roughs) varies. We recommend that soil tests be done before using land like this for food production. It's important to note though that soil tests for pesticides can become quite expensive.

Most testing laboratories will provide an option to "screen" your soil for the presence of a panel of chemicals. This is the most economical way to proceed, as it will determine if there are detectible amounts of certain pesticides. A&L Laboratories (http://www.allabs.com) will provide soil tests for residents throughout United States, and has a fee sheet available to view on its website. Although most agricultural extension offices only provide soil tests for nutrient composition and certain heavy metals, they may be able to recommend another lab that can test for pesticides close to home.

If the soil tests turn out to be too costly, an alternative option if you're planting a small vegetable garden is to use a raised bed lined with garden fabric and cardboard at the base to make sure that roots are unable to penetrate into potentially contaminated soil. You can also try your hand at straw bale gardening, a great way to grow vegetables when you're working with questionable soil. In fact, straw bales can even be placed on impervious surfaces like driveways –and there are virtually no problems with weeds! All that's required is a good bit of organic nitrogen fertilizer and the bale. Purchase from a local nursery you trust in order to be sure the bale doesn't contain pesticides. There's a great *New York Times* article with additional information on the subject at bit.ly/Strawbale. Best of luck in your efforts to grow pesticide-free organic veggies! This should provide you with enough information to determine whether your soil is suitable for in ground gardening.

Share With Us!

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.

Lousy Lice

Beyond Pesticides,
Please help! My 8-year old daughter brought lice back from her school and I don't know what to do! Some of the other parents are talking about lice shampoo, but I know there are harmful chemicals that I don't want her exposed to. You're my resource for non-toxic options!
-Cindy

Cindy,
Thank you for coming to Beyond Pesticides for assistance. We hope the suggestions we provide rid your daughter of lice and their eggs (nits), and you from the frustrations associated with the infestation! Luckily head lice do not carry disease, but they can spread quickly. Head-to-head contact is the most common form of transmission. Wash and put in the dryer your daughter's clothes and bedding to make sure the lice don't spread to family and friends.

Many common lice shampoos contain synthetic pyrethroids or organophosphates, which can be particularly dangerous for young children. Studies link these chemi-

cals to neurotoxic effects, cancer, and endocrine disruption and indicate that they can contaminate children's bodies after a treatment. Moreover, the latest science is showing resistance to these harsh chemicals growing rapidly, with one report indicating that 99.6% of lice are resistant to treatment with the synthetic pyrethroid permethrin. With evidence of the effectiveness of chemical treatments waning, that's a lot of risk to expose children to, especially given the availability of alternatives.

New research shows that simple conditioner is just as effective as chemical lice shampoo. Researchers explain that, "Treatment with conditioner reduces the coefficient of friction of undamaged and damaged hair. As a consequence, conditioners will facilitate nit removal." Though tedious, and the studies are ambiguous on the practice's efficacy, you can also use a nit comb after the use of a conditioner or coconut oil to loosen nits so that they can be combed out and placed in soapy water for disposal. Although most home remedy treatments have only been verified anecdotally, one study comparing vinegar, isopropyl alcohol, olive oil, mayonnaise, melted butter, and petroleum jelly found all to be ineffective. Though they successfully killed adult lice, none were effective at killing or removing the eggs. The most effective, nontoxic way to rid your daughter of lice is desiccation through heat treatment. Many local salons provide this service, as training is required to operate these machines. This treatment generally kills 100% of eggs and 80% of hatched lice. Note that experts don't recommend the home-use of blow driers as lice can become airborne and spread to others. We hope that this information helps stop the scratching! Additional information on least-toxic lice control can be found on our fact sheet *Getting Nit Picky About Head Lice*: bit.ly/nitpicky.

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.com/beyondpesticides, or send us a "tweet" on Twitter, @bpncamp!

Endocrine Disrupting Chemicals May Target Fish Hearts

Excerpt from Beyond Pesticides' original blog post (2/5/2014): According to a new study published in Environmental Health Perspectives, chemical contaminants in waterways that mimic estrogen -endocrine disruptors- target developing heart valves in fish and impair the growth of fish hearts.

Jennifer S. comments via Facebook:

"Thanks for spreading awareness; hope it can help! Rachel Carson made clear in *Silent Spring* that waterways' streambeds are loaded with the years of runoff insecticides/herbicides/biocides, and that the silty gunk conglomerates into super-lethal compounds. . . every flood stirs them up, and they go on poisoning. There's been no attempt to my knowledge to do anything about that toxic mess sitting around for over 50 years."

Show Bees Some Love!

Excerpt from Beyond Pesticides' original blog post (2/14/2014): We went out to our local Home Depot to deliver our Valentine's Day message, asking retailers to "show bees some love" and stop selling bee-killing pesticides and garden plants poisoned with these harmful chemicals. Our large crew was greeted en masse by friendly police, and not-so-friendly security, but the message was clear and true.

Catskill Native Nursery comments:

"It's not just the 'Big Box' stores. Many wholesale plant growers use neonicotinoids and they can show up anywhere. We need to put the pressure on all growers and landscapers at every level to stop using them. They should just be banned so there is no doubt!."

EPA Proposes Updated Farmworker Protection Standards to Mixed Reviews

On February 20, the U.S. Environmental Protection Agency (EPA) released its long-awaited proposal to update Farm Worker Protection Standards (WPS), which are designed to provide protections from pesticide exposure for more than two million farmworkers and their families across the nation. Historically, farmworker advocates have criticized these protections as woefully inadequate in protecting the health of agricultural workers, but these new revisions attempt to strengthen the standards through increased training for workers handling pesticides, improved notification of pesticide applications, and a higher minimum age requirement for children to work around pesticides.

Farmworkers are disproportionately at risk of pesticide exposure. According to EPA, pesticide exposure incidents are vastly underreported –in some cases by as much as 90 percent. Although these proposed changes are a step in the right direction, there are still ongoing concerns that the changes will not be adequate to protect workers from pesticides.

Revisions to the 20-year old standard have been under discussion for many years. In 2010, EPA released a document proposing WPS that would determine ways to increase training, improve safety requirements, provide clear emergency information, and create strong protection for applicators. However, EPA documents distributed during a November 2012 Pesticide Program Dialogue Committee (PPDC) meeting included few details within those goals, and brought into question the agency's previous commitments.

Advocates say that EPA enforcement of worker protection standards historically fallen short. In 2011, EPA has admitted that even with maximum feasible personal protective equipment (PPE) and engineering controls, including all provisions required by the WPS, risks to workers still exceed EPA's levels of concern. A 2008 study analyzed farmworker poisonings between 1998 and 2005 concluded that in 30% of high level pesticide exposure incidents, all labeling requirements, including those involving re-entry and PPE, had been followed, clearly indicating that the WPS and/or labeling requirements are not adequate.

Groups Sue EPA for Disclosure of Inert Ingredients on Labels

Center for Environmental Health, Beyond Pesticides, and Physicians for Social Responsibility, represented by Earthjustice, filed a complaint against the U.S. Environmental Protection Agency (EPA) March 5 for failing to complete rulemaking that would require pesticide manufacturers to disclose the inert ingredients on their pesticide product labels. An inert ingredient is any ingredient that is "not active," or specifically added to kill the target pest.

Back in 2009, EPA responded to two petitions, one by led by the Northwest Center for Alternatives to Pesticides (joined by Beyond Pesticides and 20 other organizations), and a second by 15 State Attorneys General, that identified over 350 inert pesticide ingredients as hazardous. The petitioners asked EPA to require these inert ingredients be identified on the labels of products that include them in their formulations. EPA responded to these actions in which the groups sought to compel the agency to begin the rulemaking process.

On December 23, 2009, EPA took a promising step forward, announcing its intention to seek public input on developing an inert ingredient disclosure rule. Putting forth two proposals, one would require listing of all ingredients already identified as hazardous and the other would require listing of all ingredients. The comment period for the proposals closed in April 2010, but EPA has taken no further action since then.

Billions of pounds of pesticides are dispersed throughout the U.S. and enter our food supply, homes, schools, public lands and waterways. The public knows very little about the chemicals contained in most of these pesticides because, under the *Federal Insecticide, Fungicide, and Rodenticide Act* (FIFRA), pesticide manufacturers are only required to list "active" ingredients that target a pest and not "inert" ingredients, despite the fact that many inerts are hazardous or suspected toxic chemicals.

USDA Report Cites Concerns with GE Crops

A report released in February by the U.S. Department of Agriculture (USDA) considers the trends of genetically engineered (GE) crops since their introduction 15 years ago. Responding to the surge in GE use, USDA points to increasing herbicide resistance and higher levels of herbicide use as major potential threats to human health and the environment.

Certain GE crops are currently designed to specifically to be sprayed with the herbicide glyphosate. Glyphosate is one of the most popular weed killers in both the U.S. and the world and also the active ingredient in Roundup —the leading glyphosate product developed by Monsanto. Although GE crops are claimed by manufacturers to reduce pesticide use overall, the report documents a progressive rise in herbicide use since GE crops first hit the market. According to the report, in 2002, farmers sprayed on average 1.5 pounds per planted acre, and by 2010 that average had risen to more than 2.0 pounds per planted acre. The main cause for increases in herbicide use is the rise of herbicide resistant weeds.

The report comes as USDA and the U.S. Environmental Protection Agency (EPA) are poised to approve new forms of GE corn and soybeans designed to be resistant to highly toxic 2,4-D products. The report found that, "Herbicide toxicity may soon be negatively affected (compared to glyphosate) by the introduction (estimated for 2014) of crops tolerant to herbicides dicamba and 2,4-D."

Additionally, USDA researchers did not find any definitive yield increases over the past 15 years of GE production: "In fact, the yields of herbicide-tolerant or insect-resistant seeds may be occasionally lower than the yields of conventional varieties." The report details "no significant differences" between yield of conventional seeds and GE seeds.

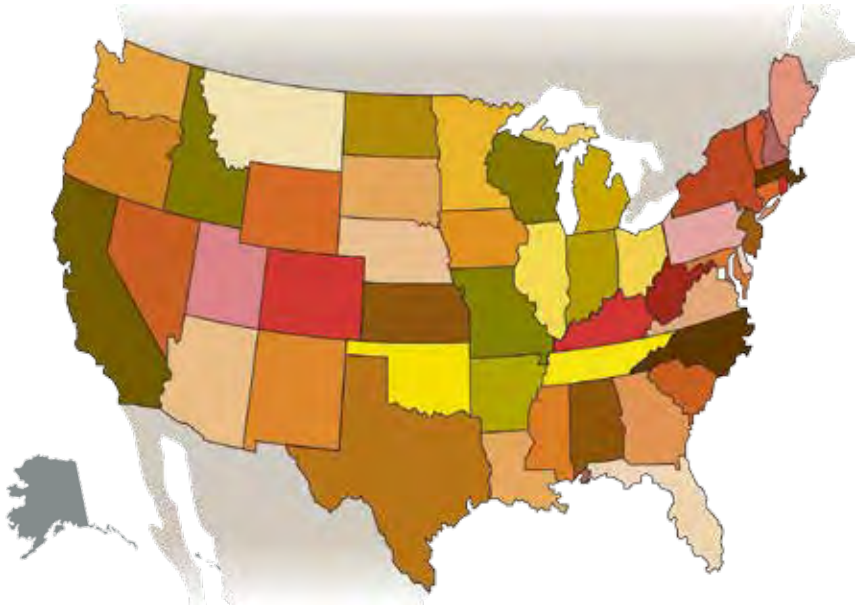
Read more in our story, *Up Next, 2,4-D,* on page 13 of this issue.

Petition Seeks Nationwide Refuge Ban of GE Crops and Neonicotinoid Pesticides

A formal petition for rulemaking with the U.S. Department of the Interior (DOI) was filed on February 25 by Center for Food Safety (CFS), Public Employees for Environmental Responsibility (PEER), Beyond Pesticides, and Center for Biological Diversity. The petition demands that the U.S. Fish and Wildlife Service (FWS), the DOI bureau tasked with managing and regulating the system of National Wildlife Refuges (NWRs) across the country, establish better protections for wildlife and their habitat by prohibiting the use of genetically engineered (GE) crops and neonicotinoid insecticides in NWRs, as well as other necessary policy changes.

The petition asserts that the allowed cultivation of GE crops and use of neonicotinoid pesticides on lands designated as NWRs violate the purpose and protective standards of the *National Wildlife Refuge Act* (NWRA). NWRA seeks to conserve, manage and restore fish, wildlife, and plant resources and their habitats for the present and future generations. It also threatens endangered species by resulting in destruction of critical habitat protected under the *Endangered Species Act* (ESA).

To remedy the legal violations and better protect the environment and wildlife dependent on NWRs from the dangers posed by GE crops and neonicotinoids, the petitioners request that FWS take several actions. First and foremost, the petition asks FWS to issue a rule that bans the planting of GE crops and use of neonicotinoids on NWRs. Second, the petitioners request that as a part of the rule, the agency amend existing regulations to exclude GE crops and neonicotinoids as compatible uses. In carrying out this action, the petition asks FWS to include specific instructions and deadlines for expeditiously phasing out such practices where they exist. Concerning ESA, the petitioners request that FWS take specific actions in order to comply with the mandates of the act and reassess endangered species impacts. Lastly, the petition requests that FWS monitor and report on GE crops, pesticide use, and GE "volunteers" (new genetically engineered plants that germinate in the fields), so that the public is informed about farming practices on refuge lands.



Proposal to Repeal Pesticide Requirements in New York Rejected

On March 29, the New York state Senate and Assembly rejected Governor Andrew Cuomo's proposed budget that would have repealed pesticide reporting requirements. Over 30 environmental and consumer groups in the state protested the language, which would have stripped away the requirement that commercial pesticide applicators report where pesticides are used, what kind they use, and how much.

The current law allows the public to access pesticide use information at the zip code level, and grants researchers access to previously confidential pesticide use data for analysis. However, the proposed rules, written into the state's Executive Budget proposal, would have dramatically restructured the state's Pesticide Sales and Use Reporting Law, to stipulate that the annual pesticide reporting summary only release detailed sales –not use– data by county.

In an open letter to New York's legislative leaders, opponents of the change argued that where things are sold are not necessarily where they are used. The inability to identify where pesticides are used in the state would have undercut the ability to track associated environmental and health effects.

"It will impede the public's ability to learn about toxic chemical uses where they work, live and play," said Peter Iwanowicz, executive director of Environmental Advocates of New York.

The regulation requiring pesticide reporting was passed in 1996 as a means to provide researchers with a way to explore the connection between pesticide use and disease. Pesticide use data is crucial to studying and identifying the human and environmental impacts associated with pesticide use. Data is used to help understand and identify incidence of disease and disease clusters, as well as monitor and protect water quality and food resources.

Lice Resistant to Chemical Treatment

According to scientists, virtually all –99.6%– of lice in the U.S. have developed resistance to over-the-counter and prescription shampoos containing the toxic chemical permethrin. The latest study on lice resistance, published in the *Journal of the Entomological Society of America*, shows that hazardous chemical treatments not only are not necessary given effective least-toxic alternatives, but also are not able to provide the lice control that manufacturers claim.

"In the UK and Europe, they don't even use pyrethroids anymore. Virtually everyone but the United States and Canada have given up using these over-the-counter products," said John Clark, PhD, a professor of environmental toxicology and chemistry at the University of Massachusetts Amherst and co-author of the new study.

In an interview with the *Detroit Free Press*, Eric Ayers, MD of the Children's Hospital of Michigan noted that lice that are not killed by the chemical treatment not only survive, but become stronger. "The more a product is used within a community, the more lice in that community become resistant," said Shirley Gordon, PhD, director of the Head Lice Treatment and Prevention Project at Florida Atlantic University. "We don't like to use the term super lice, because it's sensational and frightening. It's not a superbug, but a louse that has become resistant." According to the latest study, 99.6% of lice tested between 2007-2009 would be considered "super."

The U.S. Environmental Protection Agency's (EPA) Office of Pesticide Programs (OPP) considers permethrin, part of the synthetic pyrethroid class of chemicals, "likely to be carcinogenic." However, when used as a lice shampoo the chemical is regulated by the Food and Drug Administration (FDA) and allowed for use on infants over two months old.

Community Passes Resolution Banning Neonicotinoids

On February 26, the City of Eugene, Oregon became the first community in the nation to specifically ban from city property the use of neonicotinoid pesticides, which have been scientifically linked to the decline of honey bee colonies. The resolution also includes clear goals on children's health, expands the city's current Pesticide-Free Parks program from 10 to potentially 40 parks, and requires all departments to adopt integrated pest management (IPM) standards.

The Eugene City Council unanimously passed *Resolution 5101*, *Enhancing Current Integrated Pest Management in Parks*. The City has a history of working to protect the environment, which was cemented by an environmental policy that was adopted and implemented by the city back in 2003. Soon after in 2006, the city initiated a Pesticide-Free Parks Program to maintain city parks without the use of registered pesticides unless there is a threat to public health or safety.

The resolution notes that "children and infants may be especially sensitive to health risks posed by pesticides for several reasons: (a) their internal organs are still developing and maturing; (b) in relation to their body weight, infants and children eat and drink more than adults, possibly increasing their exposure to pesticides in food and water; and (c) certain behaviors, such as playing on floors or lawns or putting objects in their mouths, increase a child's exposure to pesticides used in homes and yards."

On neonicotinoids, the resolution refers to recent research suggesting a possible link to the die-off of plant pollinators, including honey bees, native bees, butterflies, moths, and other insects. Additionally, several bee-kill incidents occurred in Oregon last summer, including one that killed more than 50,000 bumblebees after a licensed pesticide applicator sprayed blooming linden trees, a violation of the pesticide label. After a preliminary investigation, the Oregon Department of Agriculture confirmed that the massive bee die-off was caused by the use of the neonicotinoid insecticide, dinotefuran.

Town Seeks Court Affirmation to Stop Private Pesticide Use Near Pond

The town of Chilmark located on Martha's Vineyard in Massachusetts is not backing down from its decision to challenge property owners and the local conservation commission's attempts to introduce a toxic herbicide directly into the waters of Squibnocket Pond, the only enclosed, great pond of the destination island.

Property owners and the conservation commission argue that the spraying Rodeo, a glyphosate-based herbicide, is necessary to control the invasive species phragmites, a large perennial grass found in wetlands also known as the common reed. While it is a challenging invasive species, there are alternative ways to manage it without toxic chemicals.

Massachusetts is one of the many states that have enacted preemptive pesticide legislation, which is the ability of one level of government to override laws of a lower level. This did not stop the town of Chilmark from doing what it thought was necessary to protect a valuable natural resource. A 62-page environmental study, conducted by Marine Policy Center in Woods Hole in 1990, found that the pond was significantly threatened by contaminants like pesticides. After this study, the town enacted a bylaw the same year, establishing protective standards, one of which includes a prohibition on the use of chemical fertilizers, pesticides, and herbicides within 500 feet of the pond.

The town of Chilmark is not alone its fight, both within Massachusetts and across the country. Beyond Pesticides along with other advocacy groups recently weighed-in on a similar debate concerning NSTAR's 2014 proposal to maintain rights-of-way through toxic chemical means in Cape Cod. In particularly sensitive areas like Martha's Vineyard and Cape Cod, these precautionary measures are important. Allowing local governments to emphasize this general state-law purpose through clearly defined ordinances and bylaws do not run counter to the state's authority.

Safe Grow Educational Website Launched in Takoma Park, MD

To assist in the implementation of its landmark ban on cosmetic pesticides on public and private property, the city of Takoma Park, Maryland recently completed and launched a "Safe Grow" website, featuring educational materials created by Beyond Pesticides. The in-depth website lays out the materials and cultural practices necessary to maintain lawns without synthetic pesticides. Though this website is written for Takoma Park specifically, the information it contains can be used by anyone interested in transitioning to a sustainable lawn, and is a model for other communities, whether they have an ordinance or not, in order to advance sustainable, organic turf management.

On July 22, 2013, the City Council unanimously passed the *Safe Grow Act of 2013*, which generally restricts the use of cosmetic lawn pesticides on both private and public property throughout Takoma Park. This is the first time that a local jurisdiction of this size has used its authority to restrict pesticide use broadly on private and public property, exercising its responsibility to protect the health and welfare of its residents through its local government.

The comprehensive website materials are based on a "feed the soil approach" that centers on the utilization of compost and microbial food sources, and explains the correct way to implement a variety of cultural practices. A guide was also published on establishing a new organic lawn, with recommendations on what type of grass seed to buy, soil testing, grading, and even information on alternatives to lawns.

Maintaining Sustainable Lawns and Landscapes in the City of Takoma Park is broken down into three distinct sections, transitioning to a healthy lawn, solving problems, and recommended materials for a healthy lawn. The first section on transitioning goes into great detail on different cultural practices, such has how to conduct soil tests to determine what practices are needed to develop healthy soil. The most important points made in this section is to mow high until the end of the season, aerate at least once a year, overseed turf in late summer and early fall, and apply compost tea to encourage microbial activity.

The second section, solving problems, explains the different soil imbalances that lead to a variety of weeds. For example, crab grass thrives in compacted soil, is encouraged by low mowing height, and grows well in drought conditions. By explaining what conditions produce weeds, homeowners better understand what cultural practices they need to change to eliminate toxic chemicals.

The last section, recommended materials, goes into more detail on what tools homeowners need to maintain a healthy organic lawn and where products can be found. The section outlines several biological and least-toxic pest control solutions and what pests they eliminate effectively. Instructions on how to make compost are laid out clearly, and if homeowners are uncomfortable making compost, it lists several local Maryland companies that provide it.

Beyond the guides on establishing and maintaining a lawn organically, the city published several other fact sheets, also authored by Beyond Pesticides, on its website. The materials give further information and tips on soil testing, contracting with a service provider, watering techniques, protecting pollinators, and lists supplies that are needed in a toolshed. All of the fact sheets and guides are interactive with full citations and links to additional information from a range of government agencies.

The Safe Grow Act is a landmark achievement, possible in Maryland because it is one of seven states that does not "preempt" or prohibit the adoption of local pesticide legislation. See http://bit.ly/StatePreemption. In protecting the rights of local political subdivisions within Maryland the state is subsequently enabling the protection of the health and welfare of Maryland residents.

The educational materials, including the complete guide, *Maintaining Sustainable Lawns and Landscapes in the City of Takoma Park* are available at www.takomaparkmd.gov/safegrow and on Beyond Pesticides' website at www.beyondpesticides.org/lawn/SafeGrowActModel.php.

No Longer a BIG Mystery

Recent scientific research confirms the role of pesticides in pollinator decline

"The apple trees were coming into bloom but no bees droned among the blossoms, so there was no pollination and there would be no fruit." – Rachel Carson, Silent Spring

The science has become increasingly clear that pesticides, either acting individually or synergistically, play a critical role in the ongoing decline of honey bees and wild pollinators. While studies reveal wide-ranging adverse impacts from a multitude of agents, including poor nutrition, stress, fungicides, and pathogens, the neonicotinoid class of insecticides continues to receive the greatest attention from scientists, beekeepers, and advocacy groups.

Since Beyond Pesticides first started publicizing the role of pesticides in bee decline many years ago, the organization's scientific database has identified new findings demonstrating that pesticides, especially the neonicotinoid class of insecticides, have sublethal and chronic impact on bee behavior, immune system, and colony longevity. Neonicotinoids are systemic pesticides, meaning once applied they translocate throughout the entire plant, including stems, and flowers. Pollinators, like honey bees, face unique threats from exposure to these systemic pesticides because they can be exposed through multiple pathways, including foliar applications, contaminated field dust, as well as through contaminated guttation droplets, pollen, and nectar. Since these pesticides are also very persistent in the environment, exposure becomes continuous, affecting multiple generations.

Some of the studies on pesticides and honey bees played a key role in the decision to invoke a two-year suspension of the neonicotinoids clothianidin, imidacloprid, and thiamethoxam in the European Union in April 2013. The findings of a European Food Safety Authority (EFSA) report show that these chemicals are of "critical concern" to bee health and place honey bees and hives at "high risk." Within the last few years, the number of studies linking the controversial neonicotinoids to pollinator decline has grown exponentially, reporting harm to bees' reproduction, mobility, and navigation, as well as impairments to feeding, foraging, memory, and learning.

While chemical industry giants, like Bayer CropScience, continue to dismiss pesticides as a concern, and instead choose to point to parasites and beekeeping practices as the cause for the ongoing pollinator crisis, the U.S. Environmental Protection Agency (EPA), as well as the U.S. Department of Agriculture (USDA) acknowledge pesticides as a contributing factor. EPA has requested long-term

field data on larval, queen, and colony health, and the agency is also currently reviewing the registrations of the neonicotinoids. This review will not be completed until 2018, while beekeepers warn that bees and other pollinators do not have that long to wait.

In the meantime, the independent, peer-reviewed, scientific data linking pesticide exposures to bee decline keeps growing. Some of the highlights follow.

Mounting Evidence of Toxicity

The science on bee health is reporting that even small, low-dose (sublethal) neonicotinoid exposures can have detrimental effects on bees. New research published in the journal *Ecotoxicology* in 2014 finds that "near infinitesimal" exposures –levels as low as 0.7ppb- to neonicotinoids causes a reduction in the amount of pollen that bumblebees are able to gather for their colony. The authors believe that these low concentrations are field-realistic doses. On the findings, lead author of the study, Hannah Feltham, PhD, remarked, "This work adds another piece to the jigsaw. Even near-infinitesimal doses of these neurotoxins seem to be enough to mess up the ability of bees to gather food. Given the vital importance of bumblebees as pollinators, this is surely a cause for concern." Adding to the problem, the researchers find that bumblebees continue to underperform even a month after exposure. Another study examining field-realistic doses reports that the growth rate of exposed bumblebee colonies has been significantly reduced, and suffers an 85% reduction in production of new queens.

Similarly, research by Williamson and Wright (2013) finds that sublethal doses of pesticides significantly impair important behaviors involved in foraging, implying that "pollinator population decline could be the result of a failure of neural function of bees exposed to pesticides." In this study, the authors observed that bees exposed to imidacloprid are less likely to form long-term memory, and develop impaired olfactory learning ability. To further understand this and similar findings, Palmer, et al. (2013), conducted a study attempting to understand the neurophysiological mechanisms of these effects, and reports that neonicotinoids, specifically clothianidin and imidacloprid, interfere with neuronal signaling and inhibit nicotinic responses in the brain, leading to cognitive impairments. This study also suggests that exposures to multiple pesticides with similar modes of action will cause enhanced neurotoxicity.

Other impacts observed include altered bee feeding and social behavior that can have long-term impacts on the hive. University of California at San Diego biologists (2012) found that honey bees treated with a small, single dose of imidacloprid, comparable to what they would receive in nectar, become "picky eaters" preferring to feed only on sweeter nectar and refusing nectars of lower sweetness that they normally feed on, and which provide important sustenance for the colony. In addition, waggle dances, which help bees recruit their nestmates to good food, was not frequently observed in exposed bees.

In conjunction with ongoing investigations into the role of neonicotinoids in bee health, researchers are also beginning to look at the so called "inert" ingredients of many pesticide formulations. A study released by Pennsylvania State University researchers Ciarlo, et al. (2012) observes that bee learning behavior is impaired by exposure to low doses of surfactants –other ingredients commonly found in pesticide formulations. Here, the researchers measured the olfactory learning ability of honey bees treated orally with sublethal doses of the most widely used spray adjuvants on almonds in the Central Valley of California. These ingredients are only now drawing the attention of scientists, and can play a part in bee toxicity.

Beyond Neonicotinoids –Synergistic Mixtures

A mixture of pesticides can have synergistic effects, meaning they become even more toxic in combination than individually. Researchers have been recording the presence of multiple pesticides, most of which have been collected in the foraged pollen. In fact, Mullin, et al. (2010) found 121 different pesticides and metabolites within a number of wax, pollen, bee, and associated hive samples. A followup study looking at four commonly detected pesticides in pollen and wax –fluvalinate, coumaphos, chlorothalonil, and chloropyrifos, found that exposure to these chemicals has serious consequences on bee larvae survival rates: "All pesticides at hive-residue levels triggered a significant increase in larval mortality compared to untreated larvae by over two-fold, with a strong increase after three days of exposure." Here, combinations of pesticides only served to amplify mortality rates around the four-day mark. The researchers found synergistic toxicity with the

mixture of chlorothalonil and fluvalinate, and the mixture of chlorothalonil and coumaphos. Adding to concerns, researchers found that the so-called "inert" ingredient, N-methyl-2-pyrrolidone, caused major damage to honey bee health. The authors stated, "Even for the lowest concentration of [this inert ingredient], the estimated time to cause 50% larval mortality was 4 days." The study concludes that "pesticide mixtures in pollen be evaluated by adding their toxicities together."

Increased Susceptibility to Pathogens

The causes of pollinator decline are multiple and complex: pests and diseases, diet and nutrition, genetics, pesticides, and habitat loss are all contributors to pollinator decline, according to the 2012 Congressional Research Service report on the state of bee health. Increasingly, however, research shows that exposure to neurotoxic pesticides compromises bee immune system functioning, dramatically raising their susceptibility to pathogens and parasites. Many dead hives have not only been found with high residues of pesticides, but also high levels of disease and parasites. For instance, one study by researchers at USDA found an increased probability of infection from the fungal parasite *Nosema* in bees that consumed pollen with a higher fungicide load. This led other researchers to start investigating whether pesticide exposures affect bees' ability to withstand parasite infection.

Italian researchers Di Prisco, et al. (2013) set out to find the mechanism through which pesticides can adversely impact the immune system of honey bees. Their study suggests that exposure to neonicotinoids negatively modulates immune signaling in insects, and adversely affects honey bee antiviral defenses. The authors observed that honey bee exposure to clothianidin enhances this mechanism, reducing immune defenses, and promotes the onset of deformed wing virus in honey bees. Similar results were also observed with imidacloprid.

Research at USDA's Bee Research Laboratory (2012), led by Jeffery Pettis, PhD, finds that *Nosema* infections increased significantly in bees exposed to pesticides in their hives, demonstrating an

Table 1. Partial list of key studies demonstrating the impacts of neonicotinoids and other pesticides on pollinators

Species	Authors/Date	Pesticides	**Significance**
Honey bee	Zhu, et al., 2014	fluvalinate, coumaphos, chlorothalonil, chloropyrifos	Combination of the four most common pesticides found in pollen/wax synergize, increase bee larvae mortality.
	Doublet, et al., 2014	thiacloprid	Sublethal doses of a neonicotinoid pesticide interact with parasite *Nosema ceranae* and black queen cell virus to elevate honey bee mortality.
	Carrillo, et al., 2014	fipronil, imidacloprid	Learning, as evaluated through proboscis (e.g. mouthparts used for feeding) extension, is diminished.
	Di Prisco, et al., 2013	clothianidin	Altered immune response allowed replication of viral pathogens in exposed bees.
	Williamson & Wright, 2013	clothianidin, coumaphos	Long term memory, short-term memory, and odor differentiation all decrease.
	Palmer, et al., 2013	imidacloprid, clothianidin, organophosphate miticides	Cognitive damage from exposure causes "epileptic type" hyperactivity with implications for survival.
	Matsumoto, 2013	clothianidin, dinotefuran, etofenprox, fenitrothion	Demonstrates behavioral changes and declines in homing success.
	Derecka, et al., 2013	imidacloprid	Metabolizing genes for honey bee larvae reduce at low levels of exposure.
	Hatjina, et al., 2013	imidacloprid	Of the few physiological studies, this finds sublethal doses decrease phyopharyngeal glands and respiratory rhythm.
Africanized honey bees	Sandrock, et al., 2013	thiamethoxam, clothianidin	Sublethal exposure to neonicotinoids is expressed in complex fitness related ways, including a 50% reduction in offspring.
Solitary bee	Bryden, et al., 2013	imidacloprid	Chronic sublethal stress causes bee colony failure according to models.
Bumblebee	Gill, et al., 2012	imidacloprid, lambda-cyhalothrin	Combination of two pesticides impairs foraging, increases worker mortality, and reduces colony success.
	Whitehorn, et al., 2012	imidacloprid	Field realistic levels drastically reduce queen production and growth rates.
Wildlife	Goulson, 2013	clothianidin, thiamethoxam, imidacloprid	Reviews the environmental risks of these chemicals to bees, birds, and beneficials.

indirect effect of pesticides on pathogen growth in honey bees. Similarly, a French study (2011) reports that exposure to sublethal doses of pesticide results in higher mortality in *Nosema*-infected honey bees than in uninfected ones. Alaux, et al. (2010) also report that the combination of both imidacloprid and *Nosema* caused the highest individual mortality rates and energetic stress, suggesting a synergistic interaction between these agents and, in the long-term, a higher susceptibility of the colony to pathogens. Also of note is the impact of pesticide exposure during the developmental stages of bees. Wu, et al. (2012) finds that a higher proportion of bees reared from high levels of pesticide contaminated brood comb became infected with *Nosema* at a younger age, compared to those reared in low residue brood combs.

Recently, Furst, et al. (2014) state that deformed wing virus and *Nosema* could be spreading from honey bees to bumblebees, dramatically shortening the lifespan of wild bumblebees. It suggests that managed, highly-dense populations of honey bees are breeding grounds for pathogens, which may then be transmitted to wild bumblebee populations. Infected bumblebees, however, are much more affected by the disease, with their lives shortened by six full days.

Systemic Contamination Making Broader Impact

In a comprehensive review released in 2013, Dave Goulson, PhD, provides the first overview of the widespread issue of neonicotinoid contamination, persistence, and impacts on wildlife. Taking data from chemical manufacturer Bayer, Dr. Goulson analyzes the persistence of neonicotinoids in soil and water. The data reveals that the soil half-life of the most commonly used neonicotinoid seed treatments can range from 200-1000 days. Clothianidin, in particular, has a half-life of 148-6,931 days. (Note: Other estimates of half-life range from 148 to 1,555 days.) According to Dr. Goulson, once in soil, neonicotinoids have a high propensity to leach into groundwater, streams, and ponds. For instance, one California study (2012) reports 89% of water samples taken from rivers, creeks, and drains in the state contain imidacloprid, with 19% of those samples at levels above EPA guidelines.

After neonicotinoids are applied to farmland, their persistence in soil and water can cause broad and far-reaching impacts on ecosystem health, much of which is not fully studied. Dr. Goulson explains, "Any pesticide that can persist for many years, build up in soil, and leach into waterways is likely to have effects far beyond the pest insects it intends to target. This is particularly so when the pesticide is highly toxic to non-target organisms. For example, less than one part per billion of the neonicotinoid imidacloprid in streams is enough to kill mayflies."

Krupke, et al. (2012) have also reported detecting neonicotinoids in the soil of planted fields and unplanted fields. Neighboring plants, such as dandelions, which bees visit, are also found to contain neonicotinoids. This study finds high levels of clothianidin and thiamethoxam in planter exhaust material (field dust) produced during the planting of treated seed. These contaminated dust plumes (also referred to as fugitive dust) can travel for miles, depositing residues far off-site. Work by both Drs. Krupke and Goulson provide strong evidence that the concentration of neonicotinoids found in agricultural fields have the potential to cause catastrophic acute and sublethal impacts on honey bees and on colony level success for honey bees and bumblebees.

In addition to bees, Pierre Mineau, PhD suggests that pesticide toxicity to birds is also an important factor in grassland bird declines. In a report released by the American Bird Conservancy (2013), Dr. Mineau finds that it takes a single corn kernel to kill a song bird and about 1/10th of a corn seed per day to impact avian reproduction. This report also identifies aquatic systems as under threat from neonicotinoid contamination. According to the report, contamination levels in both surface and ground water are already beyond the threshold found to kill many aquatic invertebrates, leading to long-term impacts on aquatic food chains.

What You Can Do

As pollinator declines continue at an unprecedented rate, the time for action is now. The risk that neonicotinoids and other bee-killing pesticides pose to the stability of the global food system and the natural world warrants their permanent prohibition. Beyond Pesticides and others want EPA to take neonicotinoid-treated seeds off the market. See www.BEEprotective.org to find out how you can help this effort and how to get your community, schools, and local government to take action to protect pollinators.

For a fully cited version of this article, please go to www.BEEprotective.org. Drew Toher, Xoco Shinbrot, and Nichelle Harriott contributed to this piece.

Next Up: 2,4-D

Weed and insect resistance caused by genetically engineered crop failure treadmill

By Nichelle Harriott

2,4-D Corn and Soybeans: Bad for Agriculture, Bad for the Environment, Bad for Health

The U.S. Department of Agriculture (USDA) is on the verge of allowing into cultivation the latest round of genetically engineered (GE) crops –corn and soybeans engineered to be resistant to the highly toxic herbicide 2,4-D. The agency released its draft Environmental Impact Statement (DEIS) last December for public comment, announcing its plan to deregulate these crops. This is a devastating decision for farmers, the environment, and public health. 2,4-D, one ingredient in the deadly Agent Orange that was used to defoliate forests during the Vietnam war and the cause of severe illness in exposed veterans, will now enter the environment at elevated rates as integral to a cropping system that uses 2,4-D-tolerant engineered crops. This, despite decades of science showing that this chemical is highly toxic, linked to numerous short- and long-term health and environmental impacts.

Behind this development is a story that has been unfolding in the science literature and on farmland across the country. Genetically engineered, herbicide-tolerant, Roundup Ready crops (created by Monsanto) are failing. The GE crops, originally designed to be cultivated with and tolerant of the use of the herbicide Roundup (glyphosate), have spawned a new generation of resistant "superweeds." These superweeds are no longer being killed by Roundup, whose use on these crops has increased dramatically since their introduction in 1996. In fact, one 2012 report shows that GE crops have been responsible for an increase of 404 million pounds of pesticide, or about 7%, in the U.S. over the first 16 years of commercial use of GE crops (1996-2011). The prolific presence of Roundup in the environment means that wild plant/weed species gradually developed an immunity to the chemical. Not surprisingly, industry's solution to the growing GE-induced weed resistance, given that its business model requires increasing pesticide sales, is to develop new engineered crops tolerant to more toxic pesticides. Those following the history of chemical-intensive agriculture, which developed with World War II chemicals and an orientation to killing unwanted organisms rather than preventing them with management practices, are watching history repeat itself –from the pesticide treadmill to the herbicide and insecticide-tolerant GE crop treadmill. What makes this point in history different, however, is the burgeoning organic agriculture and food industry that has proven the commercial and economic value of soil-building practices and systems respectful of beneficial organisms.

A Solution for Weed Resistance?

2,4-D tolerant corn and soybeans, and their accompanying use of 2,4-D (a new choline salt of 2,4-D, Enlist™), are being marketed by the petitioner Dow AgroSciences as a solution to combat the surge in Roundup-resistant weeds brought on by Roundup Ready GE crops and the accompanying increase in herbicide use. In theory, 2,4-D, with its different mode of action, would now control these resistant weeds.

However, experts say these new 2,4-D-tolerant crops and the associated increased 2,4-D use will not provide the solution to escalating weed resistance. Instead, they threaten to introduce more damage to plants through the selection of yet another strain of resistant weeds –2,4-D resistance. It is therefore counterintuitive and futile to treat the impacts of GE use with more GE crops and increased herbicide use.

USDA estimates 2,4-D use to increase 1.75-3 times current use, with the new GE corn and soybean crops. Independent estimates are much higher. Additionally, USDA notes in its DEIS that, given the prevalence of Roundup-resistant weeds, it is "very likely" that 2,4-D resistant weeds will occur, and that the adoption of 2,4-D corn and soybean can have a "potentially significant environmental impact" on the proliferation of resistant weeds, due to an increased reliance on 2,4-D for weed control. Further, the agency acknowledges that possible onset of 2,4-D resistant weeds will mean that farmers relying on 2,4-D will likely experience "increased socioeconomic impacts from more costly and restrictive weed control alternatives" to combat these weeds. Already, 28 species across 16 plant families have evolved resistance to the synthetic auxin herbicides, of which 2,4-D is one. They mimic plant growth hormones (also known as plant growth regulators). Sixteen species of plants are known to be resistant specifically to 2,4-D. As 2,4-D resistance grows, chemical-intensive farmers will look to even more toxic chemicals to control these weeds at great economic and environmental costs.

Given that USDA is aware of the problems associated with GE crops, herbicide use, and the onset of resistant weeds, it is remarkable to those tracking the technology that the agency is effectively encouraging successive generations of GE crops. Critics say that the agency should be encouraging farmers to move to sustainable farming practices that protect the economic and environmental future of U.S. agriculture.

Ignoring the Science: 2,4-D Drift, Dioxin Contamination, Threats to Human and Environmental Health

Compounding the costs of weed resistance is the inherently toxic nature of 2,4-D and the environmental damage that can occur. 2,4-D drift has long been a known problem to off-site locations, endangered species, and non-target crops. Many forms of 2,4-D volatilize above 85°F and 2,4-D drift has been known to damage specialty crops, like tomatoes and grapes, half a mile or more from the application site, even at concentrations 100 times below the recommended label rate. In addition to non-target plants, 2,4-D can impact species listed under the jurisdiction of the *Endangered Species Act* (ESA). In fact, in 2011, the National Marine Fisheries Service (NMFS) identified 2,4-D as likely to jeopardize all listed salmonid, based on current registration and label directions. No surprise that 2,4-D is also commonly detected in surface and ground water in regions of heavy use.

Dow AgroSciences maintains that the new 2,4-D choline salt formulation (Enlist™), which will be exclusively used with the new 2,4-D-tolerant corn and soybeans, is anticipated to have lower volatility (50 times lower) and, as a result, decreased drift compared to other forms of 2,4-D. However, the technical information supporting this has not been made available for public or peer review. Moreover, the surfactants and adjuvents added to commercial mixtures that can substantially alter volatility are, at present, unknown. There is no publicly available data to verify Dow's claims. The U.S. Environmental Protection Agency (EPA) is currently reviewing the registration of 2,4-D, including this new choline salt, but will not have a decision before 2017.

2,4-D ChemWatch Profile

CAS Registry Number: 94-75-7

Use: B2,4-Dichlorophenoxyacetic acid, commonly known as 2,4-D, is a widely used herbicide in the phenoxy class of chemicals. 2,4-D is a selective herbicide used to kill broadleaf weeds, and is the most commonly used pesticide in the non-agricultural sector, and in the top 10 most common in the agricultural sector, with 25-29 million pounds being used in the U.S. annually.

Mode of Action: 2,4-D is a plant growth regulator, and mimics the natural plant growth hormone, auxin. It causes rapid cell growth leading to plant death. While 2,4-D is normally applied to a plant's leaves, it can be absorbed through the roots and stems. 2,4-D is produced in several forms, including acids, salts, amines and esters, and its toxicity varies between the different forms.

Environmental Fate & Toxicity: 2,4-D is said to have low persistence in both soil and water. However, 2,4-D has a high potential to leach from soils, and therefore a potential for contaminating groundwater. 2,4-D has been shown to have negative impacts on a number of animals. 2,4-D is slightly toxic to wildfowl and slightly to moderately toxic to birds. In frogs, 2,4-D interferes with a sex hormone and stops frog eggs from maturing. 2,4-D is linked with both cancer and testicular problems in dogs. Exposure of certain dogs to lawns treated with phenoxy herbicides is associated with an increased risk of bladder cancer. The herbicide also has negative effects on a range of beneficial insects. It reduces offspring numbers in honey bees, kills predatory beetles and ladybug larvae.

In addition to the environmental consequences 2,4-D use brings, the pesticide's contamination with dioxins remains a part of 2,4-D's chemistry. While recent manufacturing advancements have reduced dioxin levels in 2,4-D, the threat of dioxin contamination is still very much a consequence of 2,4-D use. The science is very clear that dioxins are a class of chemicals that cause cancer, reproductive and developmental problems, damage the immune system, and interfere with hormones. They have left a toxic legacy for human and environmental health across the U.S. due to their persistence and toxicity. The issue of 2,4-D contaminants, such as dioxins that are present in formulations, has been ignored and is probably much more serious in terms of degradation issues than the "active ingredient." Dioxins have notoriously long half-lives, are bioaccumulative, and present broadly significant health risks developmentally and postnatally, including increased risk of heart disease and diabetes.

In regard to human toxicity, the scientific literature demonstrates that 2,4-D as an active ingredient is neurotoxic, mutagenic and genotoxic, and poses serious risks to human health. 2,4-D is also an endocrine disruptor and is known to interfere with the thyroid hormone. According to EPA, current data "demonstrate effects on the thyroid and gonads following exposure to 2,4-D, [and] there is concern regarding its endocrine disruption potential." EPA researchers found that persons with urinary 2,4-D presence have low levels of thyroid hormone. Their results also indicate that exposure to 2,4-D is associated with changes in biomarkers that have been linked to risk factors for acute myocardial infarction and type-2 diabetes. Other studies find that those exposed to 2,4-D have poor semen quality. Higher rates of birth defects are also observed in farmers with long-term exposure to 2,4-D.

Occupational exposure to 2,4-D has also been observed to increase the risk of Parkinson's disease. Studies have reported that 2,4-D has effects on dopaminergic neurons in experimental settings and is associated with more than a three-fold increased risk of the disease. 2,4-D is also associated with non-Hodgkin lymphoma (NHL) and a high incidence of NHL has been reported among farmers and other

Right to Know How Food Is Produced

People nationwide want the right to know whether or not their food is grown with or contains GE ingredients. A recent *New York Times* poll shows national support for GE labeling reaching 93%, a number consistent with past polls showing broad support that cuts across race, gender, socio-economic class, and political party affiliation. Consumers are concerned with the environmental and human health impacts that are associated with the cultivation of GE crops. They care about the food they eat.

In the absence of a federal labeling requirement, it is up to the states to give consumers the information they need to make informed choices for their families. States passing legislation are putting consumers first and give them the power of choice. People want to be able to make choices in the marketplace that they believe are protective of their family's health and the larger environment in which food is grown. Because we have a regulatory system at the federal level that has deregulated major GE crops in agriculture without complete health and safety reviews associated with their cropping systems, consumers want the ability to make independent judgments. This is especially true in light of increased pesticide use in GE crops, elevated pesticide exposure, and residues of modified toxins found in human blood samples.

Politico reported early in 2014 that, "The Grocery Manufacturers Association, on behalf of the food industry, is pitching to Capitol Hill lawmakers a bill that would preempt any state mandatory GMO labeling requirement by creating a voluntary labeling standard..." The discussion draft of the legislation would prohibit states from requiring GE food labeling legislation.

occupational groups working with 2,4-D. According to the National Cancer Institute, frequent use of 2,4-D, has been associated with two- to eight-fold increases of NHL in studies conducted in Sweden, Kansas, Nebraska, Canada, and elsewhere. Farmers using 2,4-D are associated with an increased risk of NHL in 131 lymphohematopoietic cancers (LHC) in a case-control study embedded in a cohort of 139,000 members of United Farm Workers of America (UFW) diagnosed in California between 1988 and 2001.

Advocates have argued that the science has shown for decades that 2,4-D is a chemical whose use should be decreasing, not increasing with new chemical-reliant crops. With environmental damage to non-target plants, possible dioxin contamination and human health concerns, 2,4-D has proven that it is harmful for the environment and human health.

Non-GE and Organic Farmers Left to Fend for Themselves

It is inevitable that genetic drift from GE fields can contaminate non-GE and organic crops. For instance, corn, a wind pollinated crop, has the potential to have its genetic material (pollen) transfer across neighboring plants and crops. Evidence suggests that GE corn plants can cross-pollinate non-GE corn plants up to and beyond a distance of 200 meters. Unfortunately, many farmers have been sued by Monsanto after GE genetic material was detected on their farms. Industry giants like Monsanto claim that farmers are responsible and liable for its genetic property being found on land farmed by farmers who did not pay to cultivate the company's genetically engineered crop. Organic farmers have continued to fight for their rights against GE contamination, but it has been an uphill battle. A 2011 lawsuit, *Organic Seed Growers and Trade Association (OSGATA) et al., v. Monsanto*, sought to protect farmers from GE trespass. A District Court dismissal (2012), followed by a U.S. Court of Appeals decision (2013) upholding the lower court, entered under the rules of evidence an assurance from Monsanto that it would not sue farmers with "trace amounts" (less than 1%) of GE crop contamination for patent infringement. According to Reuters, between 1997 and 2010 the agrichemical giant filed 144 patent-infringement lawsuits against farmers that it said made use of its seed without paying royalties. The U.S. Supreme Court refused to hear the case. Organic and non-GE farmers remain seriously concerned that their farms and livelihoods will be adversely affected by GE contamination.

USDA, in deregulating GE crops, continues to put non-GE and organic farmers at risk from economic losses and legal retaliation from industry. The agency believes that these farmers should take steps to defend themselves by erecting barriers and buffer zones, or delaying planting to minimize contamination. With this scenario, the burden lies solely on the farmer, who is afforded little to no redress for lost value of the contaminated crop and still unprotected from GE drift. Even though Dow claims that the new formulation of 2,4-D is less volatile than other forms, 2,4-D drift remains a serious concern.

Failed Promises, New Way Forward

The proposed deregulation of GE crops is being met with criticism from farmers, environmentalists, and other concerned groups. A decision to deregulate 2,4-D-tolerant crops and allow its unrestrained marketing will exacerbate the treadmill of U.S. chemical-intensive farmers becoming more dependent on toxic inputs to grow food. Thus far, after billions of dollars in research and public relations campaigns, the promises made by the biotechnology sector have not come to pass. GE crops have ushered in increased pesticide use, increased weed resistance, and a regression to more toxic chemicals. Additionally, GE yields are not significantly higher than non-GE.

Similar to previous decisions to deregulate other varieties of GE soybeans, alfalfa, and sugar beets, safety advocates charge that USDA continues to fail at taking into account several scientifically-validated environmental and human health concerns, especially in light of documented problems created by these herbicide-tolerant GE crops.

2,4-D and its resistant crops, as well as other herbicide-tolerant strains, are not the solution for weed resistance created by increased herbicide use on GE crops deregulated by USDA. Had proper precaution and thorough environmental assessment been conducted for previous GE decisions, the economic and environmental fallout of resistant weeds could have been avoided. It is time for the agency to focus on organic practices and other sustainable, integrated methods for long-term weed management, which allow the nation's farmers to get off the toxic GE treadmill.

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

Insecticide Incorporated GE Crops

Genetically engineered crops are often broken down into two categories, herbicide-tolerant and plant-incorporated protectants (PIPs), a euphemism for pesticide-incorporated plants. In addition, crops are also engineered or "stacked" to express multiple traits, such as crops that are resistant to multiple herbicides or are resistant to herbicides and incorporate insecticides.

PIPs are created when scientists take the gene for a specific pesticidal protein and introduce it into the plant's genetic material. Then the plant continuously expresses the pesticidal protein that kills the target insect when it feeds on the plant. Both the protein and its genetic material are regulated by the Environmental Protection Agency (EPA). The plant itself is not regulated.

In 1995, EPA registered the first *Bacillus thuringiensis (Bt)* plant-incorporated protectant for use in the U.S. Since then, EPA has registered 11 *Bt* plant-incorporated protectants, although five are no longer active. Corn and cotton *Bt* incorporated varieties were introduced in 1995 and a *Bt* variety of soy was registered in 2010.

Insect resistance to the engineered crops has raised concerns about the efficacy of natural *Bt* used in organic food production and the loss of an important tool.

Resistance

Target insect or plant resistance is a predictable consequence of prophylactic and repeated pesticide use, as has been seen with the use of antibiotics. How quickly pesticide resistance develops depends on the frequency of use, the mechanisms of resistance, the size of the gene pool, and the rapidity of the organism's reproductive cycle.

Reports of resistance to certain varieties of *Bt*-incorporated plants have been widely reported. A study, "Severe Corn Rootworm Injury to *Bt* Hybrids in First-Year Corn Confirmed" (Spencer and Gray, 2013), identified significant damage from western corn rootworm in farm fields that were planted with GE corn incorporated with a *Bt* protein referred to as "Cry3Bb1," which has been inserted into nearly one-third of the corn planted in the U.S.

"Field-Evolved Resistance to *Bt* Maize by Western Corn Rootworm" (Gassman et al. 2011) verifies the first field-evolved resistance of corn rootworm to a *Bt* toxin.

EPA has concluded that, "Corn rootworm may not be completely controlled by Cry3Bb1 in certain parts of the corn belt." (2013)

"Potential shortfall of pyramided transgenic cotton for insect resistance management" (Brévaul et al 2013) found that stacking several *Bt*-incorporated traits does not stop resistance.

Older Insecticides Brought Back

According to the *Wall Street Journal* (2013), insecticide sales soared in 2013 as target insects have developed resistance to GE crops that incorporate an insecticide. Pesticide manufacturers American Vanguard, FMC Corp, and Syngenta have all reported higher sales in 2012 and 2013 than in previous years. Syngenta alone reported doubling sales in 2012. Similarly, American Vanguard reported soil insecticide revenues rose by 50% in 2012.

Environmental and Food Contamination

In a 2011 study, "Evidence of reduced arbuscular mycorrhizal fungal colonization in multiple lines of *Bt* maize" (Cheeke et al. 2011) found that the cultivation of GE corn, which expresses *Bt*, has negative impacts on beneficial soil life. Their findings show a decreased presence of beneficial arbuscular mycorrhizal fungi (AMF) colonization in multiple *Bt* maize.

"Occurrence of maize detritus and a transgenic insecticidal protein (Cry1Ab) within the stream network of an agricultural landscape" (Tank et al. 2010) finds that streams throughout the Midwest are contaminated with transgenic materials from corn crop byproducts, with BT toxin at 23 percent of the sites.

StarLink™ GE corn, only registered for domestic animal feed, was detected in taco shells, indicating that it had entered the human food supply.

Human Health Risks

"Maternal and fetal exposure to pesticides associated to genetically modified foods in Eastern Townships of Quebec, Canada" (Arisa et al. 2011) found that the Cry1Ab toxin was detected in 93% of maternal blood samples, 80% of fetal blood samples and 69% of the nonpregnant women's blood.

"A Comparison of the Effects of Three GM Corn Varieties on Mammalian Health" (Spiroux de Vendômois et al. 2010) found that three varieties of *Bt*-incorporated corn crops show varying levels of adverse health effects, primarily in the liver and kidneys, in addition to the heart, adrenal, spleen and blood cells.

Risks to Organic

Use of natural *Bt* in organic crops production is part of a systems approach and only used when needed. However, resistance caused by GE *Bt* will undermine the effectiveness of this tool.

Farm Bill 2014

Sustainability Not a Big Winner

Big steps for big ag as organic achieves small advances

By Aimee Simpson

After nearly two years of debate, missed deadlines, and Congressional dysfunction, President Obama signed into law on February 7, 2014, the *Agricultural Act of 2014*, known as the Farm Bill. Passage of the bill was met with mixed reviews on all fronts. While national headlines focused on the issues of supplemental nutrition assistance program (SNAP, or food stamps) cuts, subsidies, and crop insurance, the near 1,000-page law also addressed critical issues relating to health and the environment.

Steps Forward

Clean Water Pesticide Permits: The clear winner for health and environmental advocates is in the defeat of a House bill provision that called for pesticide applicators to be exempt from *Clean Water Act* (CWA) permitting protections. Proponents of the provision argued it was necessary to prevent duplicative regulation, more specifically that the *Federal Insecticide Fungicide and Rodenticide Act* (FIFRA) already regulates the spraying of pesticides directly into surface waters. In fact, the attention to localized use patterns of pesticides that result in direct deposition into waterways with the CWA's National Pollutant Discharge Elimination System (NPDES) permits, are important to improved protection and reversing the findings of pesticides in water tested nationwide.

Organic Program Support: No doubt persuaded by the ever-expanding market share of organic products and their staggering market value, which U.S. Department of Agriculture estimates at $28 billion in 2012, the organic label and its associated growers, handlers, and consumers came out ahead in a few key ways with the passage of the Farm Bill.

- **Crop Insurance that Reflects True Organic Market Value.** Under the Farm Bill, organic producers will be able to insure crops at prices consistent with their retail value. Past provisions limited crop insurance amounts to non-organic counterparts. The change will ensure organic farmers are not disproportionately affected in case of a crop failure or other problems.
- **Cost-Share Program Continued for Farmers Transitioning to Organic Agriculture.** Because obtaining organic certification can

be expensive for small producers at the outset, the *Organic Foods Production Act* (OFPA) established a cost-share program. The cost-share program assists small farmers and handlers in offsetting a portion of the costs of annual certification. The House Farm Bill removed this provision, but the final bill signed into law includes renewal of this key program.

- **Support for Organic-Focused Research, Technological Upgrades, and Market Monitoring.** Since organic farmers face challenges very different than those of their chemical-intensive farmer counterparts, increased funding in the bill for the Organic Agriculture Research and Extension Initiative (OREI) is critical to finding organic solutions in organic farm systems. In organic farming, this means identifying preventive approaches to insect and weed management, and production efficiency. Additionally, the bill funds the Organic Production Market and Data Initiative (ODI), which collects information vital to maintaining stable markets, creating risk management tools, and increasing exports.

Steps Backward

Children Exposed to Sulfuryl Fluoride: The heaviest blow to public health and safety came in the form of a conference committee amendment reversing an EPA decision to ban food uses of sulfuryl fluoride based on sound scientific evidence demonstrating excessive aggregate exposure to fluoride and years of public health advocacy efforts to enforce *The Food Quality Protection Act* (FQPA standards. (See in-depth story on sulfuryl fluoride on page 21.) Though children and adults continue to face excessive exposure to fluoride through aggregate pesticide residues found in water, food sprayed with sulfuryl fluoride during storage, and other sources, industry lobbyists managed to exempt "nonpesticidal sources of fluoride" from aggregate exposure assessments.

The Democratic Process: With the passage of the sulfuryl fluoride amendment, not only were safety standards dealt a severe blow, but so too was the democratic process. Going into the conference committee, only the House version of the Farm Bill included a study provision and delay on sulfuryl fluoride with no mention of an exemption from pesticide aggregate exposure assessment standards. While Beyond Pesticides objected to this stalling tactic through a letter to committee members back in October 2013, little if any information reached the public concerning the dramatic changes taking place to this House provision behind conference committee doors.

True Protections for Pollinators: Falling far short of what pro-pollinator groups had hoped would bring much needed scientific attention, funding, and federal regulatory focus on the pollinator-decline issue threatening food supplies everywhere, the final Farm Bill left most of these provisions in the cut pile on the conference committee floor. Instead of establishing a pollinator task force and research lab facility, the Farm Bill only requires interagency collaboration to produce guidance on enhancing pollinator health and long-term viability. Conservation programs that commit to pollinator habitat also receive new preferences. These minor nods to the severe problem facing pollinators are lacking in any true incentives for change (be it in the form of stick or carrot) or meaningful protections. In response to this disturbing loss, the pollinator provision's sponsor, Rep. Alcee Hastings (D-Fla.), was reported saying, "If we don't have pollinators, we don't have any food." (Note: The 2015 USDA budget, under the agency's strategic goal of assisting rural communities, includes $25 million for a "public-private innovation institute" to focus on "pollination and pollinator health.")

Monitoring of Imported Pesticide-Laced Seeds: A seemingly mundane provision that made its way into the Farm Bill significantly alters EPA's ability to track the importation of genetically-engineered (GE) seeds and any incorporated pesticides they contain. A Farm Bill provision amends FIFRA to no longer require the responsible reporting official, the Secretary of Treasury, to notify EPA when imports of GE seeds containing pesticides arrive in the country, as long as the pesticide is registered. Removal of this reporting requirement will make it even harder to ensure EPA enforcement, should illegal seeds find their way into commerce.

Non-Agribusiness Farmers and Taxpayers. Even with gains for

Here We Go Again

At Beyond Pesticides, we are always hopeful that legislators will see the light and stop attempting to roll back the few protections in place against the dangerous use of pesticides. Unfortunately, even after three failed attempts and barely a month after the Farm Bill was signed into law, legislators have renewed their effort concerning CWA permits and filed yet another bill with the same purpose. We encourage readers to let Congress know that this bill will eliminate an important CWA permitting program to control direct application of pesticides to surface waters. See Beyond Pesticides Threatened Waters webpage: www.beyondpesticides.org/water.

organic programs and the elimination of direct cash payment subsidies, very little of the staggering $956 billion in Farm Bill spending to occur over the 2014 to 2023 period will find its way into the pockets of family farmers --especially organic farmers. Understanding that $756 billion of that number goes toward SNAP benefits, large portions of the remaining sum will fall into the hands of agribusiness and chemical industry giants in the form of crop insurance subsidies. And the richest farmers still stand to gain the most when calling on crop insurance payouts as proposed income limits were rejected. Add in the fact that proposals to track where taxpayer dollars are going under these crop insurance payouts were also defeated, and the bill is one expensive, lopsided, secretive measure where most family farmers lose out.

Organic Enforcement and Public Access to Enforcement Information: Organic does not mean much if the standards behind the label are not enforced. Of course, strong enforcement relies on strong laws and regulations. Unfortunately, the *Organic Foods Production Act* (OFPA) suffers from some glaring holes in its enforcement framework, a fact amplified by the enforcement fiasco surrounding Aurora Dairy, the nation's largest organic milk producer, a few years back. Both House and Senate versions of the Farm Bill included revisions to OFPA's enforcement provisions and attempted to "fix" some of the glaring holes by calling for more clearly outlined enforcement procedures, assigning investigatory authority to USDA's Secretary, imposing stronger reporting investigatory cooperation requirements, and expanding potentially unlawful acts. Neither of the provisions were very successful in achieving any of the proposed and needed fixes. The result is improved enforcement provision that provides the Secretary with more explicit investigatory authority, and tightens recordkeeping and surrender mandates. The big negative even within these small fixes is that the Farm Bill also includes a confidentiality provision that eliminates any likelihood of the public being able to access information on potential violations.

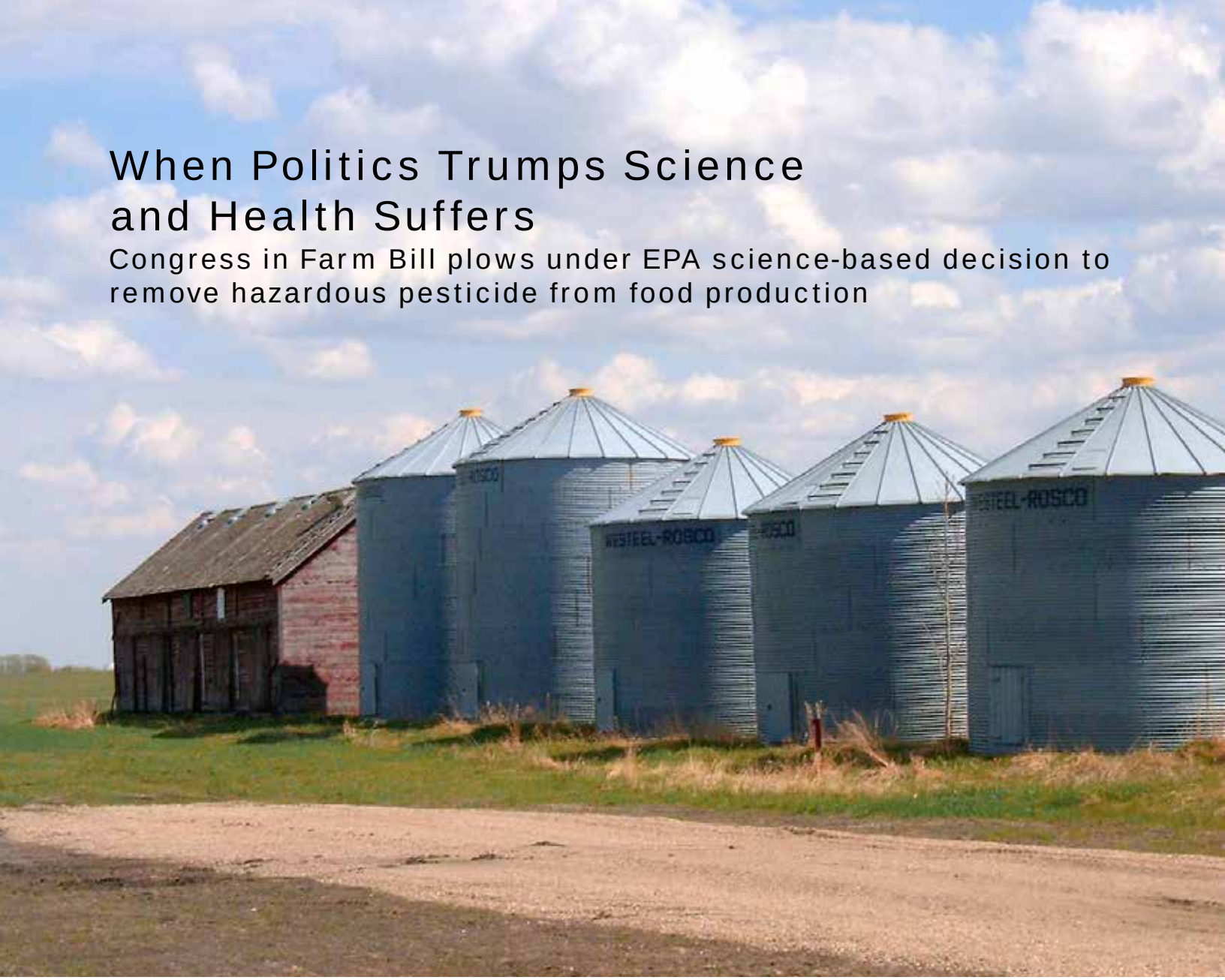
Protections for Forests Against Runoff and Pesticides: Under a provision titled, "Silvicultural Activities," legislators cemented what most environmentalists would argue was a wayward Supreme Court ruling issued earlier last year concerning CWA's control over runoff from logging operations. According to the U.S. Forest Service, "Silviculture" refers to the "art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis." In truth, this term really refers to logging and other timber-related industries that rely heavily on clearcutting techniques to fell and remove entire forests. As if the adverse environmental impacts of this practice on forest ecosystems and water sources were not enough, logging industries often hose down felled areas with pesticides to control unwanted plants and pests in their removal and replanting efforts. For years, environmentalists have fought to require CWA permits for the significant runoff stemming from these operations. While the CWA specifically exempts agricultural runoff, it does not exempt runoff from timber operations—at least until the Supreme Court decided otherwise. Not an unforeseen loss, but still a loss for forest ecosystems everywhere, it remains to be seen if applications of pesticides in and near surface waters during silviculture activities are included in this exemption.

Conclusion

Overall, the steps forward in the Farm Bill are meaningful, while the steps backwards are serious flaws in the protection of health and the environment. Industries that benefit from large payouts, now in the form of crop insurance subsidies, and limited or reduced restrictions on toxic chemical use do not put us on a sustainable path forward. At a period in history when everyone agrees that pollinators are threatened like never before, the silence in the Farm Bill is deafening. The Farm Bill outcomes suggest the critical importance of local and marketplace action, where those who seek a sustainable future with clean air, water, and safe food increase the demand for environmental and marketplace decisions that effect the change that is needed.

When Politics Trumps Science and Health Suffers

Congress in Farm Bill plows under EPA science-based decision to remove hazardous pesticide from food production



By Jay Feldman and Matthew Porter

The U.S. Congress, in the 2014 Farm Bill (*Agricultural Act of 2014*), includes a provision that requires the Environmental Protection Agency (EPA) to ignore the science and law that establishes the safety threshold for exposure to fluoride. The use of the pesticide sulfuryl fluoride, allowed in food production since 2004, in combination with fluoride use in water fluoridation, creates unacceptable hazards under EPA and National Academy of Sciences (NAS) scientific determinations. However, in an intervention that simply defies the scientific literature and thresholds for safety, the bill language orders EPA not to follow the law and science. The regulatory agencies responsible for protecting public health have identified elevated risk of dental fluorosis (breaking down of teeth enamel) in young children, and possibly skeletal fluorosis (joint pain and muscle impairment), while the scientific literature raises serious issues of neurological and brain effects from elevated levels of fluoride.

Regulatory History

Sulfuryl fluoride, commonly known by its trade name Vikane, was first registered in December 1959 as an insecticide used to fumigate closed structures and their contents, including dwellings, garages, barns, storage buildings, commercial warehouses, ships in port, and railroad cars. Food-related tolerances were petitioned by Dow AgroSciences (Dow Chemical) and set for sulfuryl fluoride in 2004 for raw foods and in 2005 for processed food as post-harvest fumigant. These tolerances allowed food storage facilities with processed and raw food to be fumigated.

Both of the food-related tolerances were opposed by Beyond Pesticides, and in 2006 Beyond Pesticides, Fluoride Action Network (FAN), and the Environmental Working Group (EWG) petitioned EPA for a stay of final rules, objecting to the tolerances as allowing an excessive hazard to food consumers. In the beginning of 2011, EPA responded to this petition by granting objections to the food-relat-

ed tolerances. This decision established a phase out all food-related uses for sulfuryl fluoride over a three-year period ending in 2014. EPA agreed with the petitioners that under the *Food Quality Protection Act* (FQPA) it is required to calculate the aggregate exposure risks associated with fluoride use in food and water.

After the EPA decision, there was a flurry of activity in Congress to limit EPA's proposed phase out. In April of 2013, U.S. Representative Tom Graves (R-GA) Introduced H.R.1496, the P*est Free Food Supply Act*. This act would have forced the EPA Administrator to withdraw the proposed tolerance cancellations. The bill was referred to committee, but never moved forward.

In June of 2013, U.S. Senator Joe Donnelly (D-IN) introduced an amendment (SA 1122) to the *Agriculture Reform, and Jobs Act of 2013*, S. 954 or Senate Farm Bill, which instructed EPA to ignore naturally occurring fluoride in drinking water and fluoride in dental health products when determining aggregate exposure to sulfuryl fluoride. Amendments were not accepted during the Senate Farm Bill process, so this amendment was not added.

However, the House version of the Farm Bill, H.R. 2642, *Federal Agriculture Reform and Risk Management Act of 2013*, contained language to require a study on the public health effects of sulfuryl fluoride. This provision was adopted on July 11 in the U.S. House of Representatives' version of the Farm Bill.

As the Senate and House conferees sat down for the Farm Bill conference, tasked with merging their differing versions of the bill, the study amendment in section 9016 of the House version was the only reference to sulfuryl fluoride on the table. However, on January 27, 2014 when the conferenced bill was announced, it essentially contained the Donnelly language instructing the administrator of EPA to exclude nonpesticidal (all water fluoridation) sources of fluoride when determining aggregate risk exposure to sulfuryl fluoride. The act was signed into law on February 7.

Hill watchers are astounded by the lack of legislative process associated with the adoption of language prohibiting an agency from enforcing the law and scientific standards of enabling legislation intended to protect health and the environment. Since the U.S. Senate had taken no action on this language and the House passed a study amendment, the adoption of a prohibitory provision goes well beyond the scope of the conferencable issues under established legislative process. The proposal to overrule EPA's phase-out of sulfuryl fluoride's food uses, based on a lengthy scientific analysis and input from the NAS, was included in the House-Senate conference bill despite being excluded from the Senate Farm Bill and not taken up by the House. Meanwhile, the daily dose of fluoride through the food supply is dangerously high.

The Science Behind EPA's Decision to Remove Sulfuryl Fluoride from Food Production

In 2006, the National Research Council (NRC) of NAS released a report that recommended EPA update its fluoride risk assessment to include new data on health risks and better estimates of total exposure. The report, *Fluoride in the Drinking Water*, found that EPA's drinking water standard of 4mg/L Maximum Contaminant Level (MCL) was not adequately protective of health. The report concluded that high fluoride levels put individuals at increased risk of dental fluorosis and possibly skeletal fluorosis.

After this report, EPA's Office of Pesticide Programs (OPP) completed a peer reviewed risk assessment of fluoride exposure. OPP found that, although sulfuryl fluoride residues in food contribute only a very small portion of total exposure to fluoride when combined with other fluoride exposure pathways (including drinking water and toothpaste), the tolerance did not meet the safety standard under the *Federal Food, Drug, and Cosmetic Act* (FFDCA), and the tolerances for food uses of sulfuryl fluoride should be withdrawn.

The Data Supported EPA's Decision

EPA's decision was a clear effort to minimize the health risks that the continued use of sulfuryl fluoride would create, especially for children. The NRC report found that severe enamel fluorosis occurs at an appreciable frequency, approximately 10% on average, among children in U.S. communities with water fluoride concentrations at or near the 4mg/L MCL and that severe enamel fluorosis would be reduced to nearly zero by bringing the water fluoride levels in these communities down to below 2 mg/L. The report also found that the MCL at the current level is associated with stage II

and stage III skeletal fluorosis and possible neurological problems. By canceling the tolerances for the use of sulfuryl fluoride on raw and processed food (and thus making its use illegal in food production), EPA attempted to help populations with high levels, including natural water fluoridation, avoid obvious health risks.

Photo of an old grain elevator in Estherville, Iowa, by Jonathunder, 2006.

Beyond the NRC report, sulfuryl fluoride has been linked to other negative health effects in multiple other studies. Sulfuryl fluoride is moderately acutely toxic by oral exposure (Toxicity Category II) and slightly toxic for acute inhalation (Toxicity Categories III and IV) and dermal vapor toxicity (Toxicity Category IV). Sulfuryl fluoride has also been linked to neurotoxicity, and reproductive toxicity. (Cox, 1997)

EPA's decision to remove sulfuryl fluoride from the diet is also important because FQPA amendments to FFDCA require that a pesticide registered for use by the agency cannot exceed acceptable risk thresholds when its dietary and nondietary uses are evaluated in the aggregate. The sulfuryl fluoride phase-out decision was the first time EPA action ever resulted in a comprehensive pesticide cancellation of agricultural uses (as distinct from a voluntary cancellation by the manufacturer) because of unacceptable aggregate exposure through food and water. By dismissing aggregate exposure risk, the Farm Bill puts the concerns of chemical-intensive agriculture ahead of the health and safety of the public, despite the availability of alternative agricultural and food storage practices.

Alternatives to Sulfuryl Fluoride

Despite industry claims to the contrary, chemical fumigation is not necessary in agriculture or food storage. Ignoring the commercial viability of organic production and storage methods that have replaced hazardous chemicals in agriculture, the agrichemical industry argues that sulfuryl fluoride is less hazardous than the alternative it points to, methyl bromide. While methyl bromide is an ozone depleter, a 2009 study found that sulfuryl fluoride is a highly potent greenhouse gas, in addition to its contribution to fluorosis and neurological effects. In fact, sulfuryl fluoride can be as much as 4,000 times more efficient at trapping heat than carbon dioxide, the leading atmospheric contributor to climate change. Successful food storage facilities, like Arrowhead Mills and other organic producers, have used least-toxic methods, such as temperature manipulation (heating and cooling), atmospheric controls (low oxygen and fumigation with carbon dioxide), biological controls (pheromones, viruses and nematodes), and less toxic controls (diatomaceous earth). Neither fumigant is permitted in organic food handling and storage.

However, many existing food storage facilities are simply too old and outdated to effectively prevent pest infestations, leading to a reliance on toxic fumigation. A clean storage or processing facility, fully and regularly maintained, will be much more easily managed and kept free of pests.

Focus on Organic

After EPA's 2011 phase-out decision, the National Resource Defense Council (NRDC) submitted comments to EPA claiming that the agency's decision would lead to an increase in methyl bromide use under a legal loophole. Methyl bromide has been the chemical of choice in grain storage in chemical-intensive food production systems, but is being replaced by sulfuryl fluoride. Phased out as an ozone depleter in 2005 under the *Montreal Protocol*, to which the U.S. is a signatory, methyl bromide has been allowed to be used in the U.S. under a "critical use exemption." Even though EPA's slow phase out of sulfuryl fluoride was intented to allow time for food storage facilities to transition to alternative practices, NRDC feared the phase-out would lead to the issuance of increased critical use exemptions and increased use of methyl bromide. Beyond Pesticides argues that the exemptions should not be issued under the *Montreal Protocol*, given the commercial availability of alternative practices and the success of these practices worldwide, including in developing countries.

Conclusion

Trading an ozone depleter for a greenhouse gas that causes adverse developmental effects in children is a choice between two unnecessary and toxic options. The sulfuryl fluoride debate brings into focus the urgent need to invest in organic production practices, and no longer get trapped in the debate about whether one unnecessary highly toxic chemical is better than another similarly toxic and unnecessary chemical.

A fully cited version of this article can be found at http://bit.ly/pesticidesandyou.

by Jay Feldman

Gardener's Guide to Pesticide Elimination

Olkowski, et al., The Gardener's Guide to Common-Sense Pest Control, 2013, 391pp. $24.95. (Completely revised and updated)

This book has a wealth of practical information. Like any guide that teaches natural or organic approaches to growing plants or managing land, it begins with principles that form a "comprehensive sustainable landscape standard." (See graphic, right, from *The Gardener's Guide to Common-Sense Pest Control.)*

The authors were among the earliest to teach and write about alternatives to pesticides in management systems that prevent pest problems. Bill and Helga Olkowski and Sheila Daar ran the Bio Integral Resource Center (BIRC), which started in the 1970's, for several decades and wrote the original "IPM Bible" (the original *Common Sense Pest Control*) when it was cutting edge to talk about a systems approach, or integrated pest management, to preventing pest problems in a world committed to prophylactic synthetic chemical pest control. Today, the term IPM has been co-opted by those who refer to the "judicious use" of pesticides, which are toxic and unnecessary. This book reminds us of IPM's original meaning as a tool for decision making, which the authors refer to as "true IPM."

The tools and tips in this book for natural pest management utilize the skills of the Ph.D. entomologist that Bill is: "Tip: Because web-worms prefer to live in layers of deep thatch, [t]he optimum thatch thickness runs from ¼ to ½ in." Readers will learn the biology of the organisms that they are trying to prevent or live with.

When talking about "weed management," the authors use IPM to explain that, "Preventive approaches, called indirect management strategies, focus on reducing or eliminating the habitat that supports weeds. A direct management strategy, by contrast, is one that attacks the weed itself and reduces or eliminates its population, but not the habitat that allowed it to grow in the first place." Indirect strategies include design/redesign, habitat modification (limiting water, manipulating soil fertility, mulching to limit light), horticultural controls, complementary or competitive planting (shading out weeds, smother crops, barrier plants, close planting, replacement, allelopathy, and rotation). Direct strategies are described primarily as physical controls (hand-pulling, cultivation, mowing, flaming, soil solarization), biological controls (goats, weeder geese), and least-toxic chemicals. For example, the authors point to vinegar as a contact herbicide, and mention soap-based herbicides and weed oils. There is a chapter in the book entitled, "Some useful inorganics, organics, and botanicals." While the authors emphasize that, "The use of herbicides in home gardens is usually unnecessary," here is where a clear definition of allowed and prohibited materials becomes critical, regardless of what the system is called –IPM, sustainable, or organic.

This book is filled with the tools to make sound decisions without toxic pesticides, even though the authors cite pyrethrins and insect growth regulators as tools, while acknowledging their adverse impacts on health and the environment –the reason Beyond Pesticides advocates their prohibition in community, household, and agricultural pest management, and urges that gardeners follow the advice in this book on the essential food web of beneficial organisms in healthy soil, soil texture and structure, and techniques for soil improvement (clover, top dressing, pest-suppressive soils). Every home gardener will enjoy the section on moles.

With the information in this book, gardeners will be able to avoid any reliance on pesticides by building systems that prevent the conditions that attract the problems that they are trying to avoid or live with. This is a book about understanding nature, not controlling it (despite its title), as well as developing a reasonable threshold for "damage" acceptance. "The first rule of aphid management is to conserve the many natural enemies of aphids present in most gardens." The attention to specific garden insect and weed challenges and plant diseases is very helpful.

The authors write, "The use of insecticides for whiteflies is likely to increase the problem rather than bring it under control, because most pesticides will also kill the predators and parasitoids that normally keep whitefly in check," as pesticide use leads to whitefly resistance which leads to manufacturer recommendations to rotate pesticides, resulting in, as the authors say, the pesticide treadmill.

If anything is missing in this book it is simply the broader list of chemicals that we at Beyond Pesticides do not think should ever be used in an organic or sustainable system. Take the best of this book and read it with Beyond Pesticides' list of acceptable materials.

Save Our Organic!

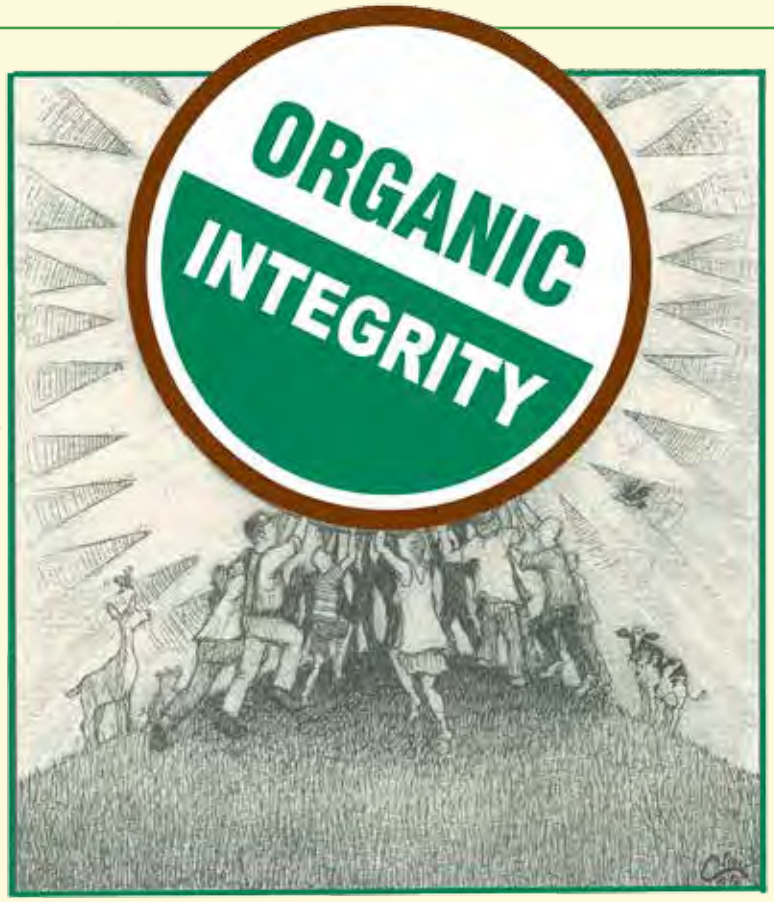
Protect Public Trust in the Organic Food Label –Help Keep the Alternative to Toxic Food Production Alive and Growing

Help defend organic standards against USDA changes that will weaken public trust in the organic food label. Organic practices follow tough standards that do not compromise the health of people and the planet. Let's grow the organic food label as a symbol that honors this tradition.

Organic Is Worth Defending

The facts are clear. Organic does offer us a cleaner environment, a safer and more nutritious food supply, less dependency on fossil fuels and water, a safer work environment, and increased carbon sequestration in slowing global climate change. However, the USDA takeover of the standard setting process could, if successful, reverse decades of work to build a credible, respected, and accountable set of standards and organic food label that have gained growing public trust.

Take action and learn more at:
www.beyondpesticides.org/SaveOurOrganic



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