Maine Board of Pesticides Control

Miscellaneous Pesticides Articles and Correspondence May 2014

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courant.com/news/connecticut/hc-pesticide-violation-enforcement-0312-20140321,0,1878369.story

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State Pesticide Compliance: Hundreds of Complaints, Few Fines

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Over the past three years, Connecticut regulators issued fines or other penalties 20 times against people and companies found to have violated pesticide laws, despite receiving more than 430 complaints.

State records obtained by the Courant show those 20 cases resulted in financial penalties totalling $69,320 between 2011 and the end of 2013, with a single company accounting for nearly $20,000 in fines for repeated violations.

"That amount of total penalties seems very small for something as important as pesticide enforcement," said Roger Reynolds, legal director for the Connecticut Fund for the Environment. He said improper use of pesticides can poison drinking water, rivers, streams, yards and homes. "Pesticide enforcement is a direct public health issue," Reynolds added.

The Courant reported last month that a lack of staff and funding for Connecticut's pesticide management unit means the state has no way to regularly monitor the use of the more than 11,000 pesticides registered for use in this state.

State law requires the more than 5,000 state-licensed pesticide applicators in Connecticut to file annual reports on their use of these chemicals, but officials admit they have never had enough staff to actually read those reports. Some companies ignore the reporting requirements for years or file incomplete information, while other paper records have been lost or misfiled.

The state's pesticide control unit staff has been cut by 25 percent over the past decade, and now numbers just nine people, including five field inspectors, state officials say. Meanwhile, registered pesticide companies now total 1,072, a figure officials say is growing every year.

"I think there is absolutely a lot more [pesticide law violations] going on that they're not finding," said Jerome Silbert, executive director of the Watershed Partnership, another environmental watchdog group.

Enforcement files show that some illegal operators used potentially toxic pesticides on Connecticut homes and properties for years before getting caught by state regulators. Other companies and a few municipalities were charged with improperly spreading pesticides on school grounds, dumping them in storm drains, or failing to file required reports about what types of chemicals they are using and how much is being used.

Diane Jorsey, an analyst with the state Department of Energy and Environmental Protection (DEEP), says most of the complaints the agency investigates involve unregistered and unlicensed individuals or businesses. Pest-control industry insiders claim unlicensed, untrained, fly-by-night operations are able to work here because of inadequate enforcement.

Across the nation, there are growing concerns about how pesticide use and misuse may be damaging public health, contributing to massive declines in honey bees and butterflies, polluting waterways and impacting agriculture and our food supply. Activists say those fears are a major reason for the dramatic growth in

organic agriculture in Connecticut.

Brad Robinson, head of DEEP's pesticide control unit, said his staff sends out about 70 warning letters a year to individuals and companies believed to be violating Connecticut pesticide laws and regulations. Approximately 90 percent of those violators take corrective action to avoid fines or license suspensions, according to Robinson.

Formal enforcement actions involving financial penalties or suspensions only result if those warning letters are ignored, Robinson said.

The pesticide unit is a division in the state Department of Energy and Environmental Protection. DEEP spokesman Dennis Schain said the goal is to "bring people into compliance… and that's not a bad outcome."

Schain said having a pesticide operator agree to halt unsafe or unlicensed practices is far better than to "have the misuse of pesticide continuing" while the state takes time-consuming enforcement action.

Activists and some state lawmakers have complained for years that continual budget cuts have severely damaged the state's ability to enforce environmental laws and regulations like those governing the use of pesticides.

Staffing at the pesticide control unit has dropped from 12 full-time staffers in 2003 to nine people today. Much of the unit's work is dedicated to certification and licensing of pesticide applicators.

Schain said the pesticide budget has also been reduced by about 25 percent since 2003. Exact numbers for what the state is spending to enforce its pesticide laws and regulations are apparently hard to come by because the unit is part of a larger budget section, Schain says.

According to department records, complaints to the state about licensed pesticide applicators have been averaging more than 140 per year. Robinson said the number of licensed applicators in Connecticut has been growing steadily for the past decade.

DEEP officials say there is no additional funding being requested for pesticide control in Gov. Dannel Malloy's proposed budget that is now being considered by the General Assembly.

Enforcement records for cases serious enough to warrant fines or suspensions show a wide variety of violations by pest-control companies, landscapers, tree-trimming operators, and even municipalities.

In November 2013, New Haven city officials agreed to a $2,475 penalty for putting anti-mosquito pesticides in storm drains. The chemical was one banned by the state in shoreline areas in an effort to protect marine animals like Long Island Sound's lobsters.

"The city's policy and practice with regard to pesticide use is strict adherence to applicable state and federal law and regulation," said Laurence Grotheer, spokesman for New Haven Mayor Toni Harp's administration.

Cheshire school officials signed a consent agreement in August 2013 requiring a $2,250 penalty involving an improper "emergency application of lawn-care pesticide" to control bees and poison ivy at two local schools. The money will go toward a University of Connecticut program to educate people about environmentally safe pest control.

Vincent Masciana, director of management services for Cheshire's school system, said the violations resulted from officials failed attempts to comply with complex state standards for using those types of pesticides around schools. Masciana says Cheshire doesn't use any pesticides on school properties except in very isolated cases, and has even received an award for its avoidance of pesticides.

The heaviest fines issued in the past three years hit a single operator, Charles Pucilauskas, doing business as Bug Busters Inc., and based in Naugatuck and Ansonia.

In December 2011, Pucilauskas signed a consent agreement involving pesticide violations that occurred during a bed-bug control application at Anna L. LoPresiti Elementary School in Seymour in 2010. The agreement carried penalties totaling $8,974.

State inspectors recorded new violations by Bug Busters Inc. at a private home in Westport in March 2012, according to the consent agreement signed last year by Pucilauskas. To settle those violations, the operator agreed to $10,845 in penalties. Pucilauskas failed to respond to repeated requests for comment for this story.

"It is unusual," Robinson said of the circumstance of finding multiple violations by a company so soon after that operation had been hit with significant fines. "Some people take longer to get the message than others."

The largest single penalty proposed in the past several years by state pesticide regulators, $12,000 against a Stratford-based man named Eddie Servance Jr., was never actually imposed. According to a 2012 consent agreement, Servance violated multiple pesticide regulations over a three year period, including failing to get proper state certification.

A state official said a determination was made that it was unlikely Servance would be able to pay the proposed fine. Instead, Servance agreed not to seek state pesticide licensing for at least three years. Efforts to reach Servance for comment on this story were unsuccessful.

Anthony Bruckner of Enfield, who was doing business as Target Pest Control, signed a consent agreement in February 2013 that involved paying $5,000 in penalties for long-standing violations.

State records show Bruckner was operating his pesticide business between 2005 and 2012 without proper state licenses and certification. The consent agreement also cited Bruckner for failing to file legally required annual reports on what types of pesticides he was using between 2000 and 2005.

"It was just a matter of not doing the paperwork on time," Bruckner said. "And I'm paying the price for it."

Environmentalists and some lawmakers have complained for years that DEEP's enforcement units have been badly hit by budget cuts in recent years.

"I think there's just not enough people to do the monitoring," said Silbert. He also believes the staffing problems in DEEP go far beyond the pesticide control unit to almost every enforcement area of the agency.

"People out there are going to comply to the extent there's real enforcement," said Reynolds. "Pesticides would seem to be a pretty big priority and a pretty serious enforcement issue."

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Print Page

By Gerry Tuoti
By Marc Larocque

March 23. 2014 10:40PM

Local researcher is shining a light on fireflies

Researchers hope a Museum of Science study will shed some light on fireflies.

Suspecting the glow-in-the dark insects are disappearing, Don Salvatore, a science educator at the Boston Museum of Science, launched the Firefly Watch in 2008. The project has more than 5,000 volunteer firefly spotters in 40 states and six Canadian provinces.

"Five years is not enough to tell whether the numbers are going up or down, but we think they're going down," Salvatore said.

Salvatore, a Pembroke resident, said he got the idea to launch the project after hearing people wonder if fireflies were vanishing across the country, including in Massachusetts.

"Many people had that perception," he said. "If you're going to act on something like that, you're going to need data. One reason we started the project was to find out if they are disappearing, and if they are, why."

He stressed that it's too soon to make any conclusions about firefly populations based on the data that's poured in from the volunteers, whose names are kept private.

"We can't tell in a short time," he said. "They seem to vary a lot year to year depending on the weather conditions. There seems to be a correlation between the temperatures we've gotten and when fireflies first come out."

PHOTO/ CONTRIBUTED | DON SALVATORE

A firefly munches on a leaf. Some people are wondering if fireflies are vanishing across the country and in Massachusetts. Researcher Don Salvatore, a science educator at the Boston Museum of Science has created a network of spotters to check how many of the tiny creatures are around.

Salvatore expects to see a late start to firefly season this year, given the long, cold winter that has gripped much of the country. Firefly season typically lasts from May through the summer.

Many people are unaware of fascinating facts about fireflies, Salvatore said. The insects live underground as larvae for two years, then come above ground in adult form to mate. They typically live for just a few weeks above ground, dying after they reproduce.

There are several species of fireflies, each with its own unique flash pattern, which it uses to attract mates, Salvatore said.

Human interference, including light pollution, weed-killers and pesticides, likely has hurt firefly populations, he said.

Public mosquito control projects, which work to combat mosquito-borne illnesses like Eastern equine encephalitis and West Nile virus, likely do not have an effect on fireflies, said East Middlesex Mosquito Control director David Henley.

The larvicides, he said, are only applied to water, making it unlikely that firefly larvae, which live underground, would be exposed.

Public mosquito-control projects use other pesticides, such as sumithrin, in such low concentrations that they would not likely kill an insect as large as a firefly, Henley said. Jennifer Dacey, superintendent of the Taunton-based Bristol County Mosquito Control Project, said she has no knowledge about sumithrin's effect on fireflies, but said that "we are very easy targets" for blame and that the pesticide is "very low in toxicity," making it not harmful to bees or birds that eat insects.

But an Easton-based environmentalist said despite what mosquito control specialists or pesticide producers might say, sumithrin does kill fireflies in flight and other insects that are larger than mosquitoes. While no comprehensive studies of the effect of sumithrin on insects has been conducted, all indications show that the pesticide does in fact kill more than just mosquitoes, whether administered through ground or aerial spraying, said Kyla Bennett, director of New England Public Employees for Environmental Responsibility.

"There is plenty of anecdotal evidence that Anvil (sumithrin) does kill fireflies," Bennett said. "You have to think of it this way: Fireflies are out at night, like mosquitoes are. They spray at night. They are out at same time of year, June through August when they are spraying most of time, and when it's not raining. And, they like the same habitat. Pesticide like Anvil is not species-specific. It's going to kill other non-intended targets. Indeed that could be one of the reasons we are seeing fewer fireflies."

Bennett acknowledged the validity of other theories about the suspected disappearance of fireflies, such as light pollution and habitat destruction, but said that she believes sumithrin also plays a significant role as local mosquito control projects pump it into the environment.

"The reason no one studies it is because there's no money to study it, because pesticide companies and the state won't fund it, because they don't want to hear the answer," she said.

Bennett pointed to anecdotal evidence reported by an Illinois entomologist in the summer of 2012 who claimed to witness the twinkling of fireflies being extinguished after a spray truck rolled through.

Bennett also said in the summer of 2006, environmental groups in Massachusetts were asked to conduct a "bed sheet test" right before aerial spraying, to show

what insects were being killed by the sumithrin. The result of the bed sheet test was that it turned up more than 100 insects that were much larger than mosquitoes, including beatles and spiders, she said.

“We put sheets out right here in Easton, and put one out in the woods and one out in grassy area, and there were two mosquitoes on the bed sheet and over 100 other insects, some of which were much, much bigger,” said Bennett, whose husband is an entomologist.

Salvatore is hopeful the firefly watch project, which compiles data online at mos.org/fireflywatch, will yield answers.

“We need to keep taking data and hopefully one day we’ll have enough to make some theories about what’s going on,” he said.

Gerry Tuoti is the Regional Newsbank Editor for GateHouse Media New England. Marc Larocque, reporter For the Taunton Daily Gazette, contributed Taunton-area information to this story.

HEAVY COSTS

WEIGHING THE VALUE OF NEONICOTINOID INSECTICIDES IN AGRICULTURE

CENTER FOR FOOD SAFETY

MARCH 2014

ABOUT CENTER FOR FOOD SAFETY

CENTER FOR FOOD SAFETY (CFS) is a non-profit public interest and environmental advocacy membership organization established in 1997 for the purpose of challenging harmful food production technologies and promoting sustainable agriculture. CFS combines multiple tools and strategies in pursuing its goals, including litigation and legal petitions for rulemaking, legal support for various sustainable agriculture and food safety constituencies, as well as public education, grassroots organizing, and media outreach.

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TABLE OF CONTENTS

Executive Summary 1

Evaluating the Risks of Neonicotinoids 2

Weighing Costs and Benefits 3

Assessing the Literature 4
- Methodology 4
- Summaries of Peer-Reviewed Literature 5
  - Corn 5
  - Soybeans 6
  - Canola, Dry Beans, and Wheat 8
- Experts Weigh in on Lack of Yield Benefits 10

Costs and Detrimental Impacts of Neonicotinoids 12
- Honey Bee Colony Impacts 12
- Reduced Crop Pollination by Honey Bees 13
- Reduced Production of Honey and Other Bee Products 14
- Loss of Ecosystem Services 15
- Market Damage from Contamination Events 15

Conclusions 16

Recommendations 17

Reviewed Literature 18

Endnotes 19

EXECUTIVE SUMMARY

This report tackles the question: **Are neonicotinoid insecticidal seed treatment products beneficial or not?** Center for Food Safety reviewed and summarized 19 articles from scientific journals that studied the relationship between neonicotinoid treatments and actual yields of major US crops: canola, corn, dry beans, soybeans, and wheat. In sum, we found that numerous studies show neonicotinoid seed treatments do not provide significant yield benefits in many contexts. European reports of crop yields being maintained even after regional neonicotinoid bans corroborate this finding. Opinions from several independent experts reinforce that neonicotinoids are massively overused in the US, without a corresponding yield benefit, across numerous agricultural contexts. The bottom line is that toxic insecticides are being unnecessarily applied in most cases.

Neonicotinoids have acute and sublethal effects on honey bees and other pollinators and are considered a major factor in colony collapse. It appears that in approving these insecticide products, the Environmental Protection Agency (EPA) has overvalued the "insurance" neonicotinoids offer against the mere risk of pest pressures, which are often not realized. This has led to heavy costs to the agricultural community and the nation as a whole. "Pre-sterilizing" fields has, in effect, rendered integrated pest management (IPM), in which pesticides are only used if economic pest damage thresholds are exceeded, obsolete for many major field crops.

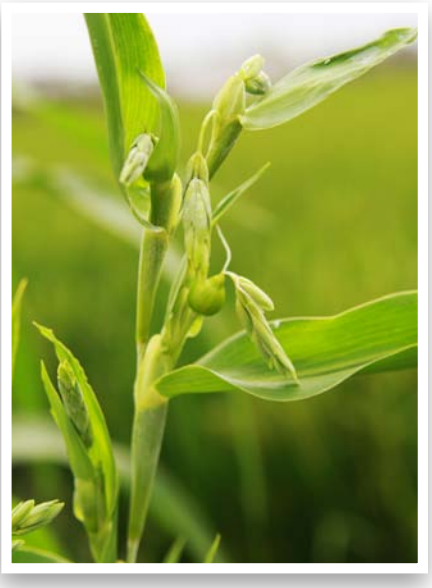
RECOMMENDATIONS

In order to fully evaluate future insecticide registration applications and comply with EPA's mandate to account for both benefits and costs, the agency should:

- Fully weigh both quantifiable and unquantifiable values in assessments of proposed systemic insecticide products, including at a minimum these foreseeable cost categories:
    1) honey bee colony impacts and resulting reduced yields of pollinated crops,
    2) reduced production of honey and other bee products,
    3) financial harm to beekeepers and consumers,
    4) loss of ecosystem services, and
    5) market damage from contamination events.
- Require verification by independent scientists and economists (preferably published in peer-reviewed journals) for claims of efficacy, crop yields, and economic benefits associated with all products.
- Reject applications to register any prophylactic insecticides that undermine basic IPM principles, may harm organic farm production, or are not cost-effective, either for the farmer or the nation as a whole.
- For all insecticidal seed treatment products, repeal the agency's waiver for "product performance data" in the EPA Product Performance regulation at 50 CFR § 158.400(e)(1) because of their prophylactic overuse, lack of efficacy, unique persistence, and high overall costs. Related to that, EPA also should promptly enforce the mandate in its regulation that: "each registrant must ensure through testing that his [sic] product is efficacious when used in accordance with label directions and commonly accepted pest control practices."

In light of the findings of this report, EPA should suspend all existing registrations of neonicotinoid seed treatment products whose costs and benefits have not been adequately weighed until this accounting is completed.

EVALUATING THE RISKS OF NEONICOTINOIDS



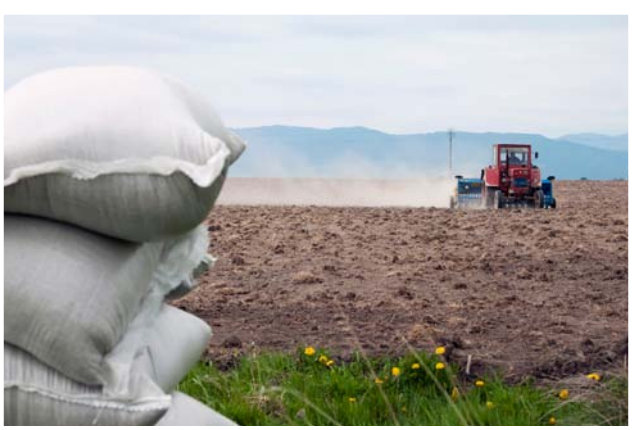
Neonicotinoids are a class of insecticides that damage the central nervous system of insects, causing tremors, paralysis, and death at very low doses. The primary neonicotinoids registered for use in the US are six relatively new (within the last 20 years) active ingredients: acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, and thiamethoxam. All are "systemic," meaning they are absorbed into treated plants and distributed in their vascular systems with water that moves up through the plant. Treating a plant or just coating a seed with neonicotinoids can render parts of the plant—including the roots, leaves, stem, flowers, nectar, pollen, and guttation fluid—toxic to insects. The toxicity of the plant varies over time depending on the part of the plant, the amount of neonicotinoid applied, and other factors. Neonicotinoids are persistent in soil and easily transported via air, dust and water to habitats in or near crop fields.[1] There, they can kill or weaken beneficial invertebrates, as well as birds and other wildlife, through direct and indirect effects.[2] Sublethal doses can result in honey bee (*Apis mellifera*) colony damage through chronic effects, including compromising the behavior, health, and immunity of colonies, thus causing them to collapse due to pathogens and parasites.[3]

The risks of using neonicotinoid pesticides are widely reported in the literature—evidence of their harms to pollinators and other beneficial insects is abundant—but what about the *benefits* of using these compounds? Seed of major crops in the US is widely treated with neonicotinoids, ostensibly to protect emerging seedlings from pests and thus improve yields. Almost all of the corn seed and approximately half of the soybeans in the US are treated with neonicotinoids.[4] More than 90% of the canola seeded in North America is treated.[5] This prophylactic pre-planting application occurs regardless of the pest pressure expected in the field, as typically there is no monitoring or sampling of crop fields for pest presence prior to application. Neonicotinoid treated seeds are commonly the only option for farmers purchasing seed. Despite marketing of these products that promotes their benefits to farmers, many peer-reviewed studies show little or no yield benefit associated with their use on crops, especially where there is low or moderate pest pressure. The studies reviewed in this report suggest that farmers are frequently investing in crop protection that is not providing them with benefits. In addition to the short-term economic costs, this presents long-term risks to sustainability for American farmers and the rural environment.

Despite their extensive use, there is a relatively small body of independent literature examining neonicotinoid use on crops. In 2011, scientists noted "there have been few peer-reviewed studies on seed-applied insecticide/fungicides probably because of the recent commercialization of these products."[6] This report surveys peer-reviewed literature that evaluates the efficacy of neonicotinoid seed treatments and finds that they are not providing a benefit to farmers for pest management across numerous agricultural contexts. The studies reviewed address major commodity crops grown in the US and Canada, but reports from other countries also show that neonicotinoids may not be providing a benefit. These studies were conducted in several regions, representing a range of climatic conditions and pest pressure levels encountered by American farmers.

WEIGHING COSTS AND BENEFITS

The Environmental Protection Agency (EPA) has the authority to approve or deny new pesticides under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).[7] FIFRA directs EPA to evaluate whether the use of pesticides (including neonicotinoids) proposed for registration presents "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental *costs* and *benefits* [emphasis added]."[8] If EPA's weighing of the foreseeable costs of a proposed product exceeds its foreseeable benefits, then FIFRA compels the agency to deny registration.



Although not all records are public, to date, no indication exists that EPA has *ever* formally denied a full registration for any proposed neonicotinoid product because its foreseeable costs exceeded its benefits.[9] Since the late 1990s, the agency has approved neonicotinoid products whose applications are estimated to now exceed 150 million acres and very likely more than 200 million acres in annual applications nationwide.[10] It is estimated that more than 500 different neonicotinoid products exist, approved for more than 150 crop, landscape, ornamental, and other uses such as structures, poultry litter, pets, and termite control. In short, it is apparent that EPA routinely judges the foreseeable costs of neonicotinoids to be outweighed by the benefits they will provide to farmers and other users. Indeed, EPA's own Product Performance regulation has waived the obligation for pesticide manufacturers to demonstrate that new pesticide products are efficacious before they are registered, with limited exceptions.[11] This indicates the agency's weighing of the products' costs versus benefits is not rigorous.

Although there is no doubt that neonicotinoids are highly toxic to insects, this does not mean they are routinely effective in pest management. This report aims to answer the question: **Are neonicotinoid insecticidal seed treatment products beneficial or not?** Center for Food Safety reviewed and summarized 19 peer-reviewed articles from scientific journals that studied the relationship between neonicotinoid treatments and actual yields of major US crops: canola, corn, dry beans, soybeans, and wheat. In sum, we found that numerous studies have documented that neonicotinoid insecticides do not provide significant crop yield benefits in many contexts. The risks and costs of using neonicotinoid seed treatments outweigh their potential benefits.

The scope of this inquiry is limited to *agricultural* benefits, because such benefits have a ready measure: relative units of crop yield. While yield is not the only possible benefit, it is certainly the one that garners the most attention from crop producers and impacts their planting decisions. It should be noted that neonicotinoids are also used in scores of landscaping, ornamental, and other non-agricultural contexts where quantification of benefits is typically infeasible because it includes aesthetics and other largely subjective measures. Deploying powerful insecticides—particularly persistent systemic compounds—in gardening and ornamental uses has been heavily criticized because of the potential for harm to beneficial insects and other positive environmental attributes.[12] Without yield as a measure, EPA's weighing of benefits, or the lack thereof, necessarily is more qualitative than quantitative for non-agricultural uses, but accurate accounting remains vitally important.

ASSESSING THE LITERATURE

This literature review compiles independent peer-reviewed studies on the use of neonicotinoid seed treatments, and concludes that in many cases, the compounds are not providing a yield or economic benefit to farmers. The studies represent a wide range of locales and weather patterns, demonstrating that the results are robust across various agricultural contexts and growing conditions. In cases where there was moderate or low pest pressure, the reviewed studies found that neonicotinoids were even less likely to provide a yield benefit. The findings indicate there is often no economic justification for using neonicotinoids as a prophylactic control measure because the cost of treatment tends to exceed that of other control options that can be used when pests reach economic levels.

The following are the major findings from this literature review:

- **Neonicotinoids either did not provide a yield benefit (8 studies[13]), or provided an inconsistent yield benefit (11 studies[14]).**
- **Using neonicotinoids frequently does not provide an economic benefit to farmers compared to alternative control methods or not treating fields when pest pressure is minimal.**
- **Efficacy of neonicotinoids varies and is difficult to predict, especially for pests that emerge around the same time in the season that the bioactivity of neonicotinoids declines.**

Several authors concluded that using neonicotinoids at best provided sporadic pest control and, for some pest species, were typically ineffective. Although neonicotinoids occasionally provided benefits in terms of reduced pest damage or other growing season parameters, in many cases these observed benefits did not translate into increased yield at the end of the season. For pests like soybean aphid, which typically emerge at an economic level after the neonicotinoids are no longer active in the plants, scientists recommend that "management should be based on scouting and applying an insecticide only when populations exceed the economic threshold."[15] They also note that the prophylactic nature of neonicotinoid seed treatments means farmers are paying to treat a threat that may or may not exist, as "producers incur a control cost prior to the manifestation of pest pressure, and this cost is not recouped with higher yield if economically damaging populations of herbivores do not occur prior to loss of bioactivity."[16] It is evident that prophylactically treating crops for pests is not benefitting farmers in terms of yield or economics when pest pressure is uncertain. Given the demonstrated harmful effects of neonicotinoids on honey bees and other beneficial insects, it is clear that they are widely overused in American agriculture to the detriment of pollination services, farmers, and the environment.

METHODOLOGY

Studies included in this review were identified by conducting online scientific literature searches for independent research that evaluated yield of major North American crops in response to neonicotinoid seed treatments.[17] This report does not provide all studies that have assessed yield and we recognize that several other studies have found benefits. However, these studies are often neither published in a peer-reviewed journal nor independent of pesticide manufacturer funding. We identified four studies that showed yield benefits from neonicotinoids in independent literature,[18] and also located industry-sponsored papers and presentations that mention yield benefits but do not include full data or methodology.[19] Benefits of neonicotinoid seed treatments have been promoted by their manufacturers, and the EPA does not require independent testing to ensure their efficacy before registering the insecticides. Given the widespread adoption of neonicotinoid seed treatments, it is concerning that there is such a small body of independent literature assessing the efficacy of the products, especially considering that many of the published studies cast doubt on their benefits.

CORN

Cox et al. (2007) evaluated the use of clothianidin seed treatment on corn in the northeastern United States, where there is occasional early-season pest pressure. The experiment included two levels of clothianidin treatment and a control without insecticides (all seed was treated with fungicides), and found that neither crop development nor grain yield were affected by clothianidin seed treatment. Weather conditions varied in the two years of the study, representing the growing conditions faced in the region. Clothianidin's use in the absence of strong pest pressure did not increase corn yields, and thus was not beneficial to farmers. The authors concluded that "we do not recommend clothianidin seed treatment as inexpensive insurance against early-season soil insect damage when corn follows soybean in the northeastern United States."

Jordan et al. (2012) tested a method of fall sampling to predict spring white grub infestations in Virginia corn fields, as well as the use of clothianidin seed treatment. The fall sampling method was able to predict the level of pest population in the spring, and thus the amount of insect damage that could be expected, which could help farmers make an informed decision about using crop protection products. Clothianidin was applied at two rates to seeds in test plots, along with untreated control seeds. Seed treatment did increase corn stand (quantity of viable plants) in two of the three years. Despite this improved stand, there was only a yield benefit in one of the three years (at the higher application rate), when the below-threshold fields were removed from the analysis. The lower application rate for clothianidin was not different from the control in this year, despite the fact that the low rate is labeled for control of white grubs. There was no yield benefit in the second and third years of the experiment (even when the below-threshold fields were excluded). When the nine fields that had below-threshold pest populations were evaluated, there was no yield difference between treated and untreated seed. These results suggest that clothianidin treatment does not improve yields in the absence of pest pressure, and is not consistently effective with pest pressure.

Petzold-Maxwell et al. (2013) investigated the use of *Bacillus thuringiensis* (Bt) corn and clothianidin seed treatment alone and in combination to control rootworm populations at sites in the midwestern United States (Iowa, Nebraska, and Illinois). There was no significant difference between the control seeds (which were treated with a low rate of thiamethoxam to manage other corn pests) and the clothianidin treatment for the survival of western corn rootworm. Although clothianidin did not significantly reduce adult survival for western corn rootworm, it did affect northern corn rootworm. Root injury levels did not differ amongst Bt varieties, but were lower in non-Bt plots treated with clothianidin versus the control. Despite this reduction in root injury, there was no yield benefit from using clothianidin in either Bt or non-Bt crops. The authors note that "the additional cost of an insecticide may not have offered farmers any economic benefits."

Wilde et al. (2007) evaluated the effects of clothianidin and thiamethoxam seed treatment on corn fields in several Kansas locations. In the absence of noticeable insect pressure, no consistent effect on yield was identified at either high or low application rates, with no significant yield difference across all plots. In those locations where there were differences, control plots occasionally had higher yields than the treated plots, suggesting that the effects of the neonicotinoids are inconsistent at best. There was no consistent effect of treatment at any application rate on grain moisture, days to silk, plant population, or yield. Experiments were also conducted in infested fields for various pests, with variable results. Some plots had increased yields from treatment, and others reduced plant damage but did not see a yield benefit. Greenhouse tests to measure emergence and growth parameters found no significant effect of

treatment. While the experiments showed that clothianidin and thiamethoxam are effective against some corn pests, they failed to demonstrate a consistent yield benefit during field trials in the absence of pest pressure. The authors concluded that their tests "did not detect significant differences in plant growth of corn that resulted in consistent increases in yield."

SOYBEANS

Cox et al. (2008) evaluated the use of thiamethoxam, imidacloprid, and fungicide seed treatments to manage soybean pests in fields in New York. Seed treatments did not affect plant density, pod density, and seed yield; and had inconsistent effects on seeds per pod and seed mass. The thiamethoxam/fludioxnil treatment produced the most seeds per pod, but the authors did not attribute this result to the effects of the compounds because they are no longer active in the plant by the time soybean reaches late reproductive stages and seed development begins. The results showed a limited effect of neonicotinoids on soybeans, thus indicating that insecticide/fungicide seed treatment is not required for soybean production in the northeastern US.

Cox and Cherney (2011) treated soybeans with clothianidin or imidacloprid and fungicides in plots following corn in New York to explore the effects of seed treatment and planting rate. Interactions between sites and seed treatment for emergence showed that the results are highly variable and site-dependent, with no clear trend of benefits. Seed treatment had inconsistent effects, increasing plant densities at some sites (up to 22%), but not at others. In terms of yield, the plots showed less than 4%, or no, increases with seed treatment. In the economic analysis, the authors suggest "there appears to be no significant advantage in partial return when using seed-applied insecticide/fungicides vs. untreated seed after adjusting for the respective optimum seeding rates." The lower seed cost from reducing planting rates was offset by the cost of treating the seed, so the switch to lower rates and treated seed was not financially beneficial. Soybean seed cost averaged $2.29/kg in 2009-2010, and the average cost of seed treatment was $0.485/kg. The authors concluded that "growers should not expect a big or consistent response to seed-applied insecticide/fungicides under typical growing conditions in the Northeast United States."

Esker and Conley (2012) explored the economic considerations for seed treatment by looking at the probability that the yield response will cover the cost of treatment. They evaluated one fungicide-only treatment and a fungicide with thiamethoxam against an untreated control for soybeans grown in Wisconsin. The primary insecticidal targets in Wisconsin are aphids, bean leaf beetle, and seed corn maggot. The more expensive thiamethoxam treatment provided a 50% or greater probability of breaking even in 22-56% of the plots analyzed. The responses were very dependent on the cultivar, and it is difficult to predict how cultivars will respond because new ones are introduced so rapidly. The authors found that there were no strong conclusions to be made from their results, noting "the complexity of the results regarding the probability of breaking even with the application of seed treatments suggests that making specific recommendations is difficult."

Johnson et al. (2009) evaluated thiamethoxam seed treatment, a prescribed insecticide/fungicide foliar spray (regardless of pest pressure), and an integrated pest management (IPM) strategy for control of soybean aphid in the midwest. IPM relies on scouting fields for insect populations and only applying foliar sprays when the economic damage threshold is reached. All three treatments protected yield and reduced aphid pressure compared to the

control, but there was no significant difference in yield between the three treatments. The authors assessed the cost effectiveness of each treatment and found that the IPM strategy had the highest probability of being cost effective. Neonicotinoid efficacy is typically diminished by the time aphid densities increase (they lose effectiveness 35-42 days after planting). Given that the occurrence of soybean aphid outbreaks is highly variable, IPM strategies are the best choice because they avoid treating fields that are not susceptible to economic damages from pest pressure. "Although there was little difference in yield among the three insecticide treatments, there was a large difference among the probability of recouping treatment costs," and neonicotinoid treatment had the lowest probability of recouping its cost. "The IPM approach was clearly the most profitable in our break-even analysis, which fits with findings across [a] broad range of US crops where IPM practices have been adopted."

McCornack and Ragsdale (2006) trialed thiamethoxam seed treatment to manage soybean aphid populations in Minnesota. Their results showed that thiamethoxam significantly reduced aphid pressure and reproduction but was only effective at causing aphid mortality and reducing reproduction during early vegetative growth stages. Late season aphid infestations cannot be controlled with seed treatment, and cannot be predicted at planting, so could require additional foliar applications, negating any advantage from using treated seed. Thiamethoxam did not significantly increase yield in years with low aphid density, but did increase yield in one year with high aphid pressure as compared to the untreated control (but was not significantly different from foliar spray plots). "In terms of yield, there was no advantage using a seed treatment over a foliar applied insecticide in any location-year." The authors concluded "at-planting application of thiamethoxam for soybean aphid control provides little consistent benefit to the grower."

Magalhaes et al. (2009) investigated the efficacy of imidacloprid and thiamethoxam seed treatments to control soybean aphids in Nebraska. The first year of the study had low aphid pressure (all below the economic threshold), and there were no differences in yield amongst the treatments. Aphid pressure was greater in the second year, and yield was higher in the treated plots than the untreated controls. Thiamethoxam kept aphid densities below the economic threshold, and imidacloprid reduced aphid densities, but not below the economic threshold. In fields managed based on threshold spraying, this would have resulted in a foliar spray still being applied to the imidacloprid treatment, negating the use of the neonicotinoid. While there was some yield benefit seen in this study, the planting dates were later, so systemic neonicotinoids were still active in the plants when aphid populations increased—this is not typically the case with soybean planting dates. Higher aphid pressures may overwhelm seed treatments and require secondary management strategies. Despite the moderate yield increases associated with neonicotinoid use in some portions of this study, the authors do not recommend their use, instead noting that "Nebraska soybean farmers would likely receive more consistent economic return by scouting fields and applying foliar insecticides only when necessary as indicated by economic thresholds."

Ohnesorg et al. (2009) utilized imidacloprid and thiamethoxam seed treatments to control soybean aphids in fields in Iowa. They compared seed treatments to foliar insecticides and an untreated control. The plots with foliar insecticides had lower soybean aphid populations and higher yields than those with seed-applied insecticides. During the first year of the experiment, some of the seed treatments provided significant yield benefits compared to the untreated control. In both years, the untreated control and seed treatment plots had the greatest exposure to aphid pressure, and in the second year, with moderate aphid pressure, there was no yield advantage from treating fields for aphids. The neonicotinoid seed treatments "provided limited, inconsistent yield protection to soybean that was occasionally not significantly different from the untreated control."

Reisig et al. (2012) investigated imidacloprid and thiamethoxam seed treatments (all treated seed also included fungicides) for the control of thrips in soybean fields in Virginia and North Carolina. Thrips are the primary early season pest of soybeans in the region. The neonicotinoid seed treatments reduced the larval and adult thrips abundance, and thiamethoxam was more effective than imidacloprid at reducing adult thrips density. Despite this, there was no difference in yield between any treatments, and no yield benefit from neonicotinoid treatment. The authors note that "very little data have been published regarding the impact of insecticidal seed treatments, despite their widespread use in the mid-South."

Seagraves and Lundgren (2012) evaluated imidacloprid and thiamethoxam seed treatments in lab trials and field conditions (South Dakota) for their effects on soybean crops and insects. Lab experiments showed that seed treatment bioactivity was gone by 46 days after planting, which would typically be prior to aphid populations damaging crops in the field. There was no consistent effect of insecticidal seed treatments on soybean aphids, thrips, and grasshoppers, but bean leaf beetles were more abundant in the untreated plots in field experiments. In South Dakota, soybean aphid typically only exceeds economic thresholds after August 1, which is well beyond the bioactivity of seed treatments. Over the two years of the study, there was no yield benefit from using treated seeds. Insecticidal seed treatment is estimated to cost producers $12-15/acre, which is a cost that will not be recouped with additional yield if economically damaging pest populations do not occur while the compounds are active. The authors conclude that this research "not only confirms that insecticidal seed treatments have little effect on the key pest of soybeans, but also suggests that this prescriptive use of some of these insecticides may harm long-term IPM of soybean pests by reducing the abundance of their key natural enemies."

Tinsley et al. (2012) investigated the control of soybean aphids provided by aphid-resistant soybean lines and by thiamethoxam seed treatment. Soybean aphids reached economically significant levels in both years. Resistant plants experienced fewer cumulative aphid days, but yields were not significantly different. Thiamethoxam also reduced cumulative aphid days in one year of the study, but not the second year, and did not provide a yield benefit. "Evidence for the ability of thiamethoxam to reduce densities of soybean aphids in this experiment was inconclusive." Seed treatments are less effective against late-season pests—thiamethoxam's utility is limited and dependent on the timing of the infestation because the bioactivity of the compound declines throughout the season. This study "reinforces the economic utility of scouting for soybean aphids and only applying a foliar insecticide when densities reach economically threatening levels."

CANOLA, DRY BEANS, AND WHEAT

Soroka et al. (2008) investigated the efficacy of acetamiprid and clothianidin seed treatments to control flea beetle damage on canola in Manitoba and Saskatchewan. The authors compared various percentages of treated seeds in the planting mix to assess whether farmers could reduce the percentage of treated seed they are planting and still maintain yields. Decreasing treated seeds by one-third (67% treated) had no consistent effect on damage, yield, or cash return. Yields for 100% treated seed were only consistently above those with 67% treated seed under very heavy flea beetle pressure. In most trials, the damage levels on the 100% treated seed exceeded the economic threshold, which would have triggered a foliar insecticide application. In the year with the least pest pressure, feeding levels did not correlate with the amount of treated seed, suggesting that efficacy is reduced in moderate years and

neonicotinoids are not providing benefits in those years. The authors concluded "reducing the proportion of treated seed sown by one third can be an effective means of reducing pesticide load to the environment while maintaining efficacy, especially in situations of low-to-medium flea beetle feeding pressure."

Pynenburg et al. (2011a) studied thiamethoxam seed treatment's ability to alleviate stress from weed pressure and white mold in dry bean fields in Ontario. The authors noted "no known published literature was found that studied the effect of thiamethoxam on plant vigor" and pesticide manufacturer representatives said that "more consistent benefits of thiamethoxam on plant vigor have been observed in dicot than monocot crops, and the benefits were more pronounced under abiotic stress conditions." Thiamethoxam had inconsistent effects with respect to plant emergence and vigor, harvested weight, seed weight, and economic returns. Each of these parameters was increased in some thiamethoxam plots and decreased in others compared to the controls, suggesting that overall, "the plant growth benefits of thiamethoxam are unclear and hard to quantify."

Pynenburg et al. (2011b) evaluated thiamethoxam seed treatment's plant enhancement abilities for dry bean production in Ontario to combat the stresses of annual weed pressure and anthracnose. Thiamethoxam increased emergence and vigor at only one location, contradicting reports of benefits from treatment. Seed quality was improved by thiamethoxam when results were pooled over all locations, but the authors could not explain this result because anthracnose severity was not reduced in thiamethoxam plots. Thiamethoxam had no effect on net yield or economic return. The authors concluded "thiamethoxam's potential to increase plant vigor was not clearly demonstrated, as it did not affect plant height, disease severity, net yield, or net economic return."

Royer et al. (2005) investigated the ability of imidacloprid seed treatment to control pests in hard red winter wheat grown in Oklahoma with several planting dates. Applying imidacloprid had varying results for aphid abundance, and in some cases the aphid abundance was not different from the untreated control. Grain yields increased with increased rates of imidacloprid application, but the economic return from imidacloprid was not usually positive. The lowest imidacloprid rate was the only rate to consistently provide a positive economic return across all planting dates. The authors note that "these data show how difficult it is to predict whether a prophylactic insecticide seed treatment will consistently pay for itself."

Wilde et al. (2001) evaluated thiamethoxam and imidacloprid seed treatments for insect control in winter wheat fields in Kansas. No yield benefit was seen in the field experiments, which had low to no pest pressure. Control of early season pests was demonstrated in greenhouse experiments with infested plants, but late season pest control was less effective and inconsistent. While the authors note that seed treatment could be useful in fields with chronic pressure from several pests, they conclude that "the use of seed treatments is economically risky where insect populations are variable" and that foliar treatments based on action thresholds are a better option.

EXPERTS WEIGH IN ON LACK OF YIELD BENEFITS

Summary reports from France and Italy show neonicotinoids provide little if any economic benefit in many contexts. Unlike North American reports, these provide detailed *before* and *after* case studies because these countries have restricted neonicotinoid use on various crops. These examples support the limited yield benefits from neonicotinoids shown in North American research:

- France banned the use of imidacloprid on sunflowers in 1999 and on corn in 2004, but the yield trends for both crops through 2007 show that the productivity was not harmed by the loss of seed treatment as a pest control measure.[20]
- The Italian Ministry of Health announced in June 2012 that it would continue the suspension of clothianidin and thiamethoxam on corn originally imposed in 2009 in response to mass bee kills that clearly resulted from neonicotinoid use. Researchers found no evidence that the suspensions caused any economic harm in Italy; corn farmers there have seen no serious pest attacks on untreated seed crops and have maintained their yields.[21]
- In 2013, the European Union voted for a two-year minimum suspension of clothianidin, thiamethoxam, and imidacloprid on bee-attractive crops and limited ornamental use to approved applicators. This may provide another broad case study to assess yield impacts if reliable follow-up monitoring occurs. However, the potentially short duration of the suspension may not provide enough time to identify changes in honey bee health as the neonicotinoids persist in soil and may be taken up by subsequent crops.

Professor David Goulson's 2013 review of impacts, after documenting the lack of any identifiable crop yield increases in the United Kingdom associated with the introduction of neonicotinoids, states:

> "Given their widespread use, it is surprising that few studies have attempted to compare the effectiveness of neonicotinoids with alternative means of pest control. Bueno et al. (2011) compared managing soya pests in Brazil using either an IPM approach or prophylactic use of insecticides (the latter primarily based on imidacloprid). Crop yields were indistinguishable in the two treatments, but pesticide use and costs were much lower in the IPM treatment, demonstrating that this remains the best alternative in this system. In North America, Seagraves & Lundgren (2012) compared yield of either imidacloprid or thiamethoxam seed dressings on soya with untreated controls and found no difference in yield in either of the 2 years of their study, but populations of beneficial natural enemies were depressed in treated plots. In this system, the evidence would suggest that the cost of seed treatment (~$30 ha) is not being recouped by the farmer. This is in accordance with a several similar studies of soya which found either no yield benefits (McCornack & Ragsdale 2006; Cox, Shields & Cherney 2008; Ohnesorg, Johnson & O'Neal 2009) or yield benefits below those which could be achieved more economically using foliar insecticides applied only when pests exceeded a threshold (McCornack & Ragsdale 2006; Johnson et al. 2009). Similarly, studies of the efficacy of imidacloprid dressing of winter wheat in North America suggest that yield benefits are small (compared to unprotected, control crops) and often exceeded by the cost of the pesticide (Royer et al. 2005)."[22]

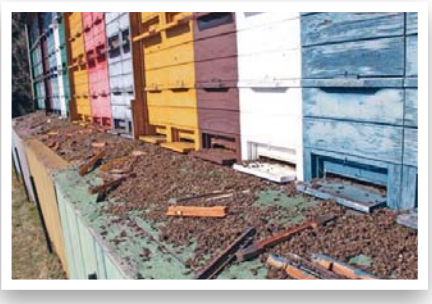
Other respected experts concur with Dr. Goulson's overview:

- Dr. Christian Krupke, Department of Entomology, Purdue University, stated: "Part of the mission of my research and extension program is annual evaluation of pest management technologies in corn and soybeans—this is a critical source of unbiased efficacy data for growers. We attempt to challenge these technologies by placing them in fields with histories of pest damage. We have not demonstrated a consistent yield benefit of neonicotinoid seed treatments in either case, over many sites and many years. This is not because the products are not toxic; it is because insect pressure at the time that neonicotinoids are active (a brief window extending only a few weeks after planting) is either absent, or too high for neonicotinoids to effectively reduce pest damage. Because there is no demonstrable benefit in the vast majority of fields/years we have surveyed, it is apparent that seed treatments are dramatically overused in these crops (all corn and the majority of soybeans are treated)."[23]
- Dr. Jonathan Lundgren, a leading USDA Agricultural Research Service entomologist studying the effects of neonicotinoids, stated: "Farmers should question whether applying neonicotinoid seed treatments are more harmful than helpful on their farms. Public sector research on insecticidal seed treatments in soybeans from across the US consistently shows that spraying pests when they exceed thresholds is more profitable than prophylactic use of insecticidal seed treatments. In corn, I have not seen evidence that there are insect pests—beyond those targeted by Bt—that warrant consistent and prophylactic management. Finally, pest management decisions need to account for the costs that insecticides have against non-target organisms like predators and pollinators."[24]
- Tracy Baute, an Ontario Ministry of Agriculture and Food entomologist and IPM expert, stated: "Based on my experience, only 10 to 20% of the corn and soybean acres are actually at risk of most of the soil pests on the [neonicotinoid] product labels."[25] In other words, 80 to 90% of the use is unnecessary. Ontario's corn and soybean growing practices are similar to those in the northern portions of the US midwest corn and soybean regions.
- Dr. Christy Morrissey, Department of Biology, University of Saskatchewan, stated: "Although the dogma that has been promoted is that we really need these chemicals in order to protect crops…there actually is very little evidence to support the extremely widespread use of these chemicals."[26]

COSTS AND DETRIMENTAL IMPACTS OF NEONICOTINOIDS

The use of neonicotinoid seed treatments is associated with a wide range of detrimental impacts, the majority of which are not fully considered by EPA as the agency evaluates proposed product registrations. These market and other impacts, summarized below, are not without additional consequences. Major financial institution reports indicate that neonicotinoid harms to honey bees and related pollinator declines could depress stock values of some publicly-held companies and harm critical agricultural sectors.[27] Farmers are paying unnecessarily for pest protection that in many cases they are not receiving. EPA must weigh all of the costs, both documented and foreseeable, along with the lack of significant crop yield benefits.

HONEY BEE COLONY IMPACTS



Science has linked neonicotinoid use to honey bee and bumblebee impacts.[28] Hundreds of documented reports detail acute mass honey bee kills via contaminated dust (graphite and talc) from planting treated corn seeds. Further, chronic ingestion of neonicotinoids can harm their foraging success and colony strength, as honey bees are social insects that rely heavily on memory, cognition, and communication. Researchers "clearly demonstrate[d] an increase in pathogen growth within individual bees reared in colonies exposed to one of the most widely used pesticides worldwide, imidacloprid, at below levels considered harmful to bees," suggesting that nonlethal effects to honey bees from low exposure levels may be extremely damaging.[29]

Prior to 2006—when neonicotinoids were beginning to be used on a nationwide scale—commercial beekeepers and honey producers typically anticipated losing fewer than 10% of their bees each year, mostly due to overwintering mortality. Losses of that magnitude were sustainable because they could be recovered by splitting hives, adding new queens, and other measures. Since 2006, however, overwintering losses have risen dramatically. While this correlation does not equate to causation, the trend is remarkable. Surveys conducted by the Department of Agriculture (USDA) show that 28% to 33% of total honey bee colonies died each winter from 2007 to 2011.[30] Winter losses dipped to 22% in 2012, but the 2013 survey indicated 31% of colonies died.[31] Compounding these overwintering losses is a marked increase in summer mortality, the season when bee populations should be thriving. According to USDA, "since 2006 an estimated 10 million bee hives at an approximate current value of $200 each have been lost, and the total replacement costs of **$2 billion dollars** has been borne by the beekeepers alone [emphasis added]."[32] That statement refers to a six-year period, thus a rough estimate of annual replacement cost is **about $300 million per year.** This magnitude of annual uninsured losses is unsustainable.

The role of neonicotinoids in honey bee decline continues to be debated. Just as there is no unassailable scientific study, there is no "smoking gun" to point to as the cause of honey bee decline. Honey bees are impacted negatively by many interacting, and sometimes synergistic, stressors. However, there are many studies across various scales that clearly demonstrate that neonicotinoids negatively affect honey bees. Whether this role is large or small may depend on the intensity of neonicotinoid use in a given region. However, when this is balanced against the reality that neonicotinoids provide little tangible benefit across the cropping systems where they are most widely used, it rapidly becomes apparent that the status quo can, and should, change.

REDUCED CROP POLLINATION BY HONEY BEES

The nationwide decline of honey bee colonies is not only a financial and personal crisis for commercial beekeepers and honey producers; it is also a direct hazard to the nation's food supply. Scientists estimate that one-third of the food people eat—and an even greater proportion of high value nutrient and vitamin sources—comes from crops that will not make fruit or seed unless they are pollinated.[33] As summarized by USDA:

> "It is imperative that we increase honey bee survival both to make beekeeping profitable but more importantly to meet the demands of US agriculture for pollination and thus ensure food security.… Currently, the survivorship of honey bee colonies is too low for us to be confident in our ability to meet the pollination demands of US agricultural crops."[34]

A prominent USDA researcher has warned that, unless trends are reversed, "[w]e are one poor weather event or high winter bee loss away from a pollination disaster."[35]

In weighing the costs to pollinators and other beneficial insects, EPA must consider the role of neonicotinoids in relation to managed honey bee and other pollinator populations. These have been valued by Kansas State University at **$12.8 billion**, based on documented average annual yield benefits for ten major crops.[36] There are more than 100 crops in North America that benefit from pollinators.[37] Kansas State researchers found that through 2010, the value of US agriculture declined by approximately **$75 million per year** compared to 1986 values due to declining pollinator numbers for the major crops they assessed. While recognizing several factors in these declines, they identified neonicotinoids as key drivers:

> "Insecticides and pesticides are applied not only on agricultural fields, but also on golf courses, in residential areas, across rangelands, etc. These pesticides and insecticides generally do not kill pollinators outright, but instead impair their development and behavior (Johnson 2010); for example, agrochemicals cause impaired odor discrimination and abnormal communication dances, which can cause mistakes in estimating distances and direction to food sources (Kearns and Inouye 1997; Thompson 2003). Gill et al. (2012) reported reduced worker foraging performance, especially pollen collecting efficiency, with chronic exposure of neonicotinoid and pyrethroid pesticide in bumblebees. Also they showed field-level exposure of these pesticides caused reduction in brood development and colony success. When agrochemical use is associated with reduced use of crop rotations, crop diversity and availability of other pollen sources are also lessened, which compounds the negative impacts on pollinators."[38]

These findings of pollinator impacts have been consistently observed and confirmed by independent scientists. According to EPA's and USDA's estimates, pollination contributes **$20 to $30 billion** in crop production annually to the US economy.[39] These massive and declining pollinator-driven crop yield benefits must be weighed against the often marginal or illusory neonicotinoid-driven crop yield benefits. The values in the Kansas State and the EPA and USDA estimates, are national-level and omit accounting for lost earnings and other financial damage to commercial beekeepers themselves, who create the bulk of that crop yield enhancement through their pollination services and colony management. Compounding the sting of these losses is the fact that EPA currently lacks a complete accounting of the economic benefits of honey bees as the agency weighs the costs insecticides pose to beekeepers.[40]

The ongoing operational and financial damage to the small cadre of fewer than 1,000 major commercial pollinating beekeepers nationwide is jeopardizing **tens of billions of dollars** of national crop-yield benefit from pollination. As bee losses mount, beekeepers must replace them to fulfill pollination contracts and raise their prices accordingly, the costs of which are, in turn, passed on to producers and consumers. If the aging and dwindling beekeeper workforce continues to struggle financially and fades away, major shockwaves would reverberate through the agricultural economy.[41]

Given the data we review in this report, over many years, locations, and cropping systems, there are no consistent benefits from using treated seeds in pest management. Coupled with EPA and USDA's own estimates, it is unreasonable for EPA's pesticide registration department to continue to allow the pursuit of non-existent or insignificant yield benefits for corn, soybeans, and other crops while contributing to mass declines in pollinators, major yield reductions in pollinator-dependent crops, and financial damages to beekeepers.

REDUCED PRODUCTION OF HONEY & OTHER BEE PRODUCTS

The impacts of neonicotinoids on honey and other bee product declines are complex. It is clear that total US honey production has dropped by more than 25% since 1994, when the first neonicotinoid (imidacloprid) was registered for use.[42] The national crop from 2013 is expected to be the *smallest honey crop ever reported* by a large margin, with a mid-range estimate of 114 million pounds compared to a mid-range estimate of 135 million pounds in 2012.[43] The average bulk wholesale value of the lost production of **21 million pounds** compared to 2012 was approximately **$38 million**.

Analysis of crop reductions over time indicates that the states with drastic honey crop declines in recent years are those in the Corn Belt with the most widespread use of neonicotinoid treated seeds, including, but not limited to, Illinois, Indiana, Iowa, Kansas, Missouri, and Nebraska.[44] Honey production in Florida, which as recently as 2000 was very high, has dropped roughly in half since the citrus psyllid was found and orange grove infections led to massive increases in use of neonicotinoids and other insecticides.[45] While statistical certainty on the causes of declines across a broad industry sector will remain elusive, the apparent contributing role of neonicotinoid-induced colony losses in huge reductions in honey, beeswax, and other valuable bee products must be taken into account.

LOSS OF ECOSYSTEM SERVICES

EPA must weigh the frequent lack of neonicotinoid yield benefits against the tremendous environmental and economic benefits and ecosystem services that neonicotinoids are jeopardizing. This goes far beyond more readily-quantified reductions in managed honey bees and bee products. Acute and chronic effects similar to those impacting honey bees can harm bumblebees and other valuable, beneficial invertebrates such as lady bugs, ground beetles, earthworms, and parasitoid wasps.[46] Beneficial invertebrates are essential, often unnoticed, components of healthy agricultural fields, landscapes, gardens, and natural systems.

In 2006, researchers estimated the value of native insect pollination for US crops at **$3.07 billion**.[47] More recently, in California alone, researchers estimated wild pollinators produce between **$937 million and $2.4 billion** per year in economic value.[48] Beyond crop pollination, beneficial predatory and parasitic insects and other arthropods provide natural pest suppression to farms, an ecosystem service valued at more than **$4.5 billion** per year, as well as to natural areas and developed landscapes.[49] Water contamination from neonicotinoids has been identified in several agricultural regions and linked to detrimental impacts in aquatic ecosystems.[50]

There are sweepingly important indirect benefits—virtually beyond calculation—gained by non-crop plant communities sustained through pollination.[51] These include the aesthetic values of flowers and ornamental plants, reduction of soil erosion, food and forage for wildlife, and maintenance of forest, grassland, desert, and other broad ecological dynamics. In 2006, Losey and Vaughan calculated the value of ecosystem services to humans from all wild insects in the US to reach **$60 billion**.[52]

MARKET DAMAGE FROM CONTAMINATION EVENTS

New financial harm from neonicotinoids has also surfaced. In February 2014, exports from Canada to Japan of the specialty, high-value grain buckwheat, were rejected due to levels of thiamethoxam contamination exceeding Japan's maximum residue limit.[53] The buckwheat farmers apparently did not use thiamethoxam on that crop—it persisted in contaminated soil from earlier plantings of other crops or was carried into their fields via air or dust. This sole incident led to the costly rejection of two container loads of buckwheat and is an ongoing problem could lead to the loss of additional export markets.[54]

CONCLUSIONS

It appears EPA has overvalued the "insurance" neonicotinoids offer against often non-existent or insignificant pest pressures in many contexts. This overuse, a direct result of EPA's regulatory approval process, imposes heavy costs to the agricultural community and the nation as a whole. "Pre-sterilizing" fields has, in effect, rendered integrated pest management, in which pesticides are only used if economic pest damage thresholds are exceeded, obsolete for those crops:

> "The widespread adoption of neonicotinoids as seed dressings has led to a move away from integrated pest management (IPM), a philosophy of pest management predicated on minimizing use of chemical pesticides via monitoring of pest populations, making maximum use of biological and cultural controls, applying chemical pesticides only when needed and avoiding broad-spectrum, persistent compounds."[55]

A 2014 report by the multi-stakeholder Corn Dust Research Consortium on neonicotinoid seed treatments and their impacts on honey bees contains these related recommendations:

- Minimize unnecessary use of seed treatment insecticides. Use them only when needed, such as where historic pest infestations are above threshold or high risk factors for pest pressure have been anticipated or determined.
- Follow the principles of integrated pest management.[56]

The broadly-supported Corn Dust Research Consortium report undercuts EPA's history of enabling unrestricted neonicotinoid use and promotes IPM as the better alternative. However, exhortations and voluntary recommendations will not change the reality of overuse spurred by advertising campaigns promoting these products directly to seed dealers and farmers. The market for seeds is heavily monopolized by a few companies.[57] In reality, US farmers often have almost no choice—untreated seeds are simply not available in most markets. It must also be recognized that synthetic neonicotinoid insecticides are not approved in organic agriculture. The harms neonicotinoids pose in and around conventional farm fields can damage nearby organic operations that rely on healthy ecosystems.

In conclusion, recent reports evaluated here examining the benefits of neonicotinoid seed treatments for crop yields in North America found they were largely illusory. European reports of crop yields being maintained even after regional neonicotinoid bans corroborate this finding. Opinions from several independent experts reinforce that neonicotinoids are massively overused in the US, without a corresponding yield benefit, across numerous agricultural contexts. The bottom line is that toxic insecticides are being unnecessarily applied in most cases.

RECOMMENDATIONS

In order to fully evaluate future insecticide registration applications and comply with the FIFRA mandate to account for costs and benefits, EPA should:

- Fully weigh both quantifiable and unquantifiable values in assessments of proposed systemic insecticide products, including at a minimum these foreseeable cost categories:
    1) honey bee colony impacts and resulting reduced yields of pollinated crops,
    2) reduced production of honey and other bee products,
    3) financial harm to beekeepers and consumers,
    4) loss of ecosystem services, and
    5) market damage from contamination events.
- Require verification by independent scientists and economists (preferably published in peer-reviewed journals) for claims of efficacy, crop yields, and economic benefits associated with all products.
- Reject applications to register any prophylactic insecticides that undermine basic IPM principles, may harm organic farm production, or are not cost-effective, either for the farmer or the nation as a whole.
- For all insecticidal seed treatment products, repeal the agency's waiver for "product performance data" in the FIFRA Product Performance regulation at 50 CFR § 158.400(e)(1) because of their prophylactic overuse, lack of efficacy, unique persistence, and high overall costs. Related to that, EPA also should promptly enforce the mandate in that regulation that: "each registrant must ensure through testing that his [sic] product is efficacious when used in accordance with label directions and commonly accepted pest control practices."

In light of the findings of this report, EPA should suspend all existing registrations of neonicotinoid seed treatment products whose costs and benefits have not been adequately weighed until this accounting is completed.

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Print

Mar 26, 2014 08:13 AM EDT

Pesticides Have Devastating Effect On Earthworms

By Kamal Nayan

Earthworm

Pesticides might be helpful for crops but their effect on earthworms living in the soil under the plants is devastating, according to a new study. The worms in such conditions only grow to half their normal weight and become incapable of reproduction.

"We see that the worms have developed methods to detoxify themselves, so that they can live in soil sprayed with fungicide. They spend a lot of energy on detoxifying, and that comes with a cost: The worms do not reach the same size as other worms, and we see that there are fewer of them in sprayed soil. An explanation could be that they are less successful at reproducing, because they spend their energy on ridding themselves of the pesticide," said researchers, Ph. D. student Nicolas Givaudan and associate professor, Claudia Wiegand, in the press release.

Researchers set up an experiment to study the behavior of the earthworm species Aporectodea caliginosa. They observed how the fungicide-exposed worms adopted to the toxic environment. They added that over the generation worms have developed a method to detoxify themselves.

Researchers also noted that there were 2-3 times more earthworms in unsprayed

soil than in sprayed soil.

"The fungicide increased metabolism rate in the worms, both the adapted worms and the not adapted worms. In the not adapted worms we saw that their energy reserve of glycogen was used faster. Contrastingly, only in the adapted worms we saw that amino acids and protein contents increased, suggesting a detoxification mechanism. They also increased their feeding activity, possibly to compensate for the increase in energy demand," researchers added.

The research was conducted by a Danish/French research team and will be published in *Soil Biology and Biochemistry*.

Food Safety News
Breaking news for everyone's consumption

EPA Stops Sale of Food Containers Made With Nano Silver

By News Desk | April 2, 2014

The U.S. Environmental Protection Agency (EPA) has ordered Pathway Investment Corporation of Englewood, NJ, to stop selling plastic food containers made with nano silver because it's an unregistered pesticide.

The company claims that the nano silver – an active ingredient in Kinetic Go Green Premium Food Storage Containers, Kinetic Smartwist Series Containers, TRITAN Food Storage and StackSmart Storage – helps reduce the growth of mold, fungus and bacteria.

But these claims can only be made on products that have been properly tested and registered with EPA, and Pathway's containers were never registered.

"Unless these products are registered with the EPA, consumers have no information about whether the claims are accurate," said EPA Regional Administrator Judith A. Enck. "The EPA will continue to take action against companies making unverified public health claims."

Some pesticides have been linked to various forms of illnesses in people, ranging from skin and eye irritation to cancer. Some pesticides may also affect the hormone or endocrine systems. In many situations, there are non-chemical methods that will effectively control pests.

EPA has also issued warning letters to Amazon, Sears, Walmart and other large retailers directing them not to sell the products. These vendors have been selling Kinetic Food Storage Containers through their websites.

The Center for Food Safety commended the agency on its action.

"This is the first time a nanotechnology-based product used on food has been withdrawn from the market, and is a major victory in protecting consumers from a technology whose health and environmental effects are still unknown, "said Jaydee Hanson, CFS senior policy analyst.

More Headlines from Government Agencies »

EPA Authorizes Companies to Make Pesticide Labels Available on Internet

Monday, April 7, 2014

By Patrick Ambrosio

April 4 --The Environmental Protection Agency will now allow pesticide registrants to make legally valid product labels accessible on the Internet.

The EPA released a pesticide registration notice, posted on the agency's website April 4, outlining a voluntary process for posting legally valid, enforceable pesticide labeling material on the Internet. Prior to issuance of the notice, which is effective immediately, no form of labeling posted on the Internet was legally valid, the EPA said.

All pesticide products still must be accompanied by a physical copy of EPA-approved labeling, but the new process will allow pesticide registrants to include a reference to a website from which pesticide applicators can download enforceable labeling. Applicators could then go to that website and download a "streamlined" version of the pesticide label, containing all necessary hazard and first aid statements and any relevant state- or site-specific use directions.

Pesticide applicators would be responsible for complying with all instructions either from the Web-distributed label or the physical label on a pesticide, according to the notice. The EPA added that pesticide users also would be responsible for complying with any state regulations or other applicable requirements requiring applicators to maintain a copy of the labeling used for applications.

The EPA said in an April 4 statement that physical product labels on pesticide packaging will not be shortened in any way due to the launch of Web-distributed labeling.

Increased Compliance, Faster Updates

The EPA said that the Web-based labeling initiative could result in several benefits, including increased compliance with federal pesticide law.

The agency said that the availability of streamlined pesticide labels on the Internet, which would still contain all relevant information for a user's specific state and intended site of the pesticide use, could make labels clearer for applicators to understand. That could improve compliance with pesticide label requirements, protecting human health and the environment from pesticide misuse, according to the EPA.

The EPA also said the adoption of Web-distributed labeling could allow the agency to modify labels and implement label-based risk mitigation measures more quickly.

Industry Reviewing Process

CropLife America told Bloomberg BNA in an April 4 e-mail that the association still needs to fully review the pesticide registration notice. CropLife is a trade association representing more than 60 developers, manufacturers and distributors of crop protection products, including BASF Corp., Dow AgroSciences LLC and Monsanto Co.

"We don't know that the potential conflicts with state laws and regulations have all been worked out yet," CropLife said.

Section 24(b) of the Federal Insecticide, Fungicide and Rodenticide Act prohibits states from imposing labeling requirements in addition to or different from those required under FIFRA.

CropLife, in comments submitted to the EPA in 2013 on a draft version of the pesticide registration notice, suggested that the EPA change any references to "state-specific labeling" to "regional" or "geographic" labeling to indicate regional or geographic restrictions or directions that are already included on EPA-approved labeling.

The final version of the pesticide registration notice maintains the references to "state-specific" labeling.

To contact the reporter on this story: Patrick Ambrosio in Washington at pambrosio@bna.com

To contact the editor responsible for this story: Larry Pearl at lpearl@bna.com

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The pesticide registration notice on Web-distributed labeling is available at http://www.epa.gov/PR_Notices/pr2014-1.pdf.

From: Nancy Oden [mailto:cleanearth@tds.net]
Sent: Tuesday, April 01, 2014 2:19 PM
To: Jennings, Henry
Subject: Colony Collapse Disorder: European Bans on Neonicotinoid Pesticides | Pesticides | US EPA

Henry - I'm asking you to attach this (below) to the other neonic article I sent.....this is the EPA reporting on the European Commission restricting several neonicotinoids for a period of time.

The Board should take similar action, and I'm requesting that they do so. How many more years of poisoning bees shall we endure? Until they're all gone?

There is no replacement for Apis Mellifera, only poor substitutes. We need our bees, and the Board needs to act responsibly, not in the interests of the chemical companies to which some are in bondage.
http://www.epa.gov/pesticides/about/intheworks/ccd-european-ban.html

http://www.epa.gov/pesticides/about/intheworks/ccd-european-ban.html
Last updated on Thursday, August 15, 2013

About Pesticides

Colony Collapse Disorder: European Bans on Neonicotinoid Pesticides

Quick Resources

- Honeybee Colony Collapse Disorder
- Pollinator Protection

The European Commission has adopted a proposal to restrict the use of three pesticides belonging to the nenicotinoid family (clothianidin, imidacloprid and thiametoxam) for a period of two years.

The Commission's action was in response to the European Food Safety Authority's (EFSA) scientific report EXIT Disclaimer, which identified "high acute risks" for bees as regards exposure to dust in several crops such as corn, cereals and sunflowers, to residues in pollen and nectar in crops like oilseed rape and sunflower and to guttation in corn.

Main elements of the Commission's proposal to Member States:

1. The proposal would restrict the use of three neonicotinoids (clothianidin, imidacloprid and thiametoxam) for seed treatment, soil application (granules) and foliar treatment on bee attractive plants and cereals.
2. The remaining authorized uses would be available only to professionals.
3. Exceptions would be limited to the possibility of treating bee-attractive crops in greenhouses, in open-air fields only after flowering.
4. The restrictions would apply beginning December 1, 2013.
5. As soon as new information is available, at the latest within two years, the Commission would review the conditions of approval of the three neonicotinoids taking into account relevant scientific and technical developments.

Based on currently available data, the EPA's scientific conclusions are similar to those expressed in the EFSA report with regard to the potential for acute effects and uncertainty about chronic risk. However, the EFSA report does not address risk management, which, under U.S. federal law, is a key component of the EPA's pesticide regulatory scheme.

The EPA is not currently banning or severely restricting the use of the neonicotinoid pesticides. The neonicotinoid pesticides are currently being re-evaluated through registration review, the EPA's periodic re-evaluation of registered pesticides to ensure they meet current health and safety standards. The EPA bases its pesticide regulatory decisions on the entire body of scientific literature, including studies submitted by the registrant, journal articles and other sources of peer-reviewed data.

For more information

- Find out more about colony collapse disorder from the USDA Agricultural Research Service
- Learn about EPA's Pollinator Protection efforts
- EPA Responds to NRDC's 2008 Freedom of Information Act complaint

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P lqg# #Eudlq#f #P lqg#P dwhuv

Parkinson's Disease and Pesticides: What's the Connection?

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Apr 8, 2014 | By Bret Stetka |

The pesticide Parkinson's connection

Thinkstock

What exactly causes Parkinson's disease is far from figured out. But a clue has been lurking in cornfields for years.

The data confirm it: farmers are more prone to Parkinson's than the general population. And pesticides could be to blame. Over a decade of evidence shows a clear association between pesticide exposure and a higher risk for the second most common neurodegenerative disease, after Alzheimer's. A new study published in *Neurology* proposes a potential mechanism by which at least some pesticides might contribute to Parkinson's.

Regardless of inciting factors — and there appear to be many — Parkinson's ultimately claims dopamine-releasing neurons in a small, central arc of brain called the "substantia nigra pars compacta." The nigra normally supplies dopamine to the neighboring striatum to help coordinate movement. Through a series of complex connections, striatal signals then find their way to the motor cortex and voila, we move. But when nigral neurons die, motor function goes haywire and the classic symptoms set in, including namely tremors, slowed movements, and rigidity.

Pesticides first came under suspicion as potentially lethal to the nigra in the early 1980s following a tragic designer drug debacle straight out of Breaking Bad. Patients started showing up at Northern California ERs nearly unresponsive, rigid, and tremoring — in other words, severely Parkinsonian. Savvy detective work by neurologist Dr. William Langston and his colleagues, along with the Santa Clara County police, traced the mysterious outbreak to a rogue chemist and a bad batch. He'd been trying to synthesize a "synthetic heroin" — not the snow cone flavorings he claimed — however a powder sample from his garage lab contained traces of an impurity called MPTP. MPTP, it turned out, ravages dopaminergic neurons in the nigra and causes what looks like advanced Parkinson's. All of the newly Parkinsonian patients were heroin users who had injected the tainted product. And MPTP, it also turned out, is awfully similar in structure to the widely used herbicide paraquat, leading some neurologists to turn their attention to farms and fields.

In 2000, a meta-analysis linked confirmed and presumed pesticide exposure with increased risk of Parkinson's. Subsequent work supported this connection, including a large 2006 study that followed patients for nine years. The patients exposed to pesticides had a 70% higher incidence of Parkinson's when the study ended; the risk was the same for exposed farmers and exposed non-farmers, hence

some other farm-related factor wasn't to blame. The study didn't report on specific toxins, but more recent work out of The Parkinson's Institute in Sunnyvale, CA, founded by Langston after the MPTP discovery, did. The authors took detailed occupational and exposure histories from farmers and their families. Paraquat upped Parkinson's risk 2.5-fold. Rotenone was also red-flagged.

Pesticides exert their neurotoxicity in a number of ways. Both paraquat and rotenone appear to wither dopaminergic neurons via free radical production**.** Free radicals are atoms or molecules with an unpaired electron looking for a partner; they do major cellular damage by pilfering electrons from other molecules, impairing their function. Rotenone may also interfere with the normal neuronal clearance of damaged or degraded proteins. Faulty proteins accumulate, derailing various cellular processes.

The new study, from a team at UCLA, proposes yet another mechanism by which some pesticides might contribute to Parkinson's. It might also provide a major lead in understanding the disease. The team had previously found that the fungicide benomyl was associated with increased Parkinson's risk and damaged the brain by inhibiting an enzyme called ALDH that normally helps metabolize fats, proteins and toxins like alcohol (certain ALDH mutation carriers have to take it easy at the bar). ALDH also detoxifies the dopamine metabolite DOPAL. When the enzyme isn't working properly, DOPAL builds up in neurons and may explain the loss of dopaminergic neurons in Parkinson's. This time around the authors tested 26 pesticides, first for their influence on ALDH activity in rat neurons and next for any epidemiologic association with Parkinson's. Eleven pesticides inhibited ALDH at the concentration tested, eight of which could be included in the study based on available histories from 360 rural Californian patients. All eight were associated with an increased Parkinson's risk and genetic variation in the ALDH2 subtype of the enzyme increased the risk further in those exposed. The findings not only point to new culprit compounds, but reflect the growing appreciation of Parkinson's as a multifactorial disease, in many cases due to the collusion of both genetic and environmental factors.

At least 10% of Parkinson'cases are now thought to be due primarily to specific gene variants, and estimates suggest that genetics may contribute to upwards of 20% to 50%. Patients with a few specific mutations — common in people of Mediterranean descent — carry a nearly 100% chance of developing the disease. Though, as lead author Dr. Jeff M. Brontstein commented to Scientific American, while a minority of cases might be primarily due to a specific genetic or environmental risk factor, ultimately many if not most cases are likely due to gene-environment interactions. This may explain why there isn't an epidemic of Parkinson's in rural areas. Despite the large number of people regularly exposed to pesticides, not everyone has a genetic susceptibility.

This gets incredibly complicated when you consider the possibility of multiple genetic and environmental risk factors working together. It's clear that pesticides wreak havoc on the brain through a variety of mechanisms. Hence farmers and others regularly exposed are at risk for a multipronged, possibly cumulative attack. Certain industrial solvents also appear to bump up Parkinson's vulnerability. Head trauma, in combination with a particular mutation, does too. And diets high in omega-3 fatty acids, found in fish, plant and seed oils, appear to protect against the disease. The laundry list of risk factors and contributors could explain the varied symptoms experienced by Parkinson's patients. Some present early in life, some late. For many the classic motor symptoms predominate; others present with non-motor findings like sleep disturbances, constipation and depression. No two cases are identical.

The confusion isn't just clinical. Recent evidence positions Parkinson's as one of a number of related neurodegenerative disorders marked by the accumulation of abnormal proteins in the brain, including Alzheimer's disease and ALS. They all appear partially genetic, partially environmental and probably in many cases both. Neuronal protein accumulations called Lewy bodies — a pathologic hallmark of Parkinson's — are also found in the brains of Alzheimer's patients; PD-afflicted brains often contain the amyloid protein aggregates common to Alzheimer's. It's a Venn diagram of neurodegeneration.

The new findings further confirm that those whose livelihood relies on repelling pests should pay mind to their increased risk for Parkinson's, particularly if they have other known risk factors, and take precautions. They can limit exposure and avoid the riskier compounds. They can wear masks, clean up spills and wash up vigorously. Moreover, implicating ALDH in Parkinson's pathology could represent an important step toward determining a final common pathway on which the various risk factors converge, a potential holy grail for drug development, and ultimately for patients. Rarely are neurologic diseases straight forward, and Parkinson's has proved no different. But a terribly unfortunate outcome for many in search of heartier, healthier crops may have brought medicine one notch closer to deciphering a frustratingly complex disease.

Are you a scientist who specializes in neuroscience, cognitive science, or psychology? And have you read a recent peer-reviewed paper that you would like to write about? Please send suggestions to Mind Matters editor Gareth Cook, a Pulitzer prize-winning journalist

and regular contributor to NewYorker.com. Gareth is also the series editor of Best American Infographics*, and can be reached at garethideas AT gmail.com or Twitter* @garethideas.

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courant.com/news/politics/hc-gmo-bill-20140409,0,49377.story

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Senate OKs Ban On Genetically Modified Lawn Seed

But House Speaker's Opposition Likely To Mow It Down

By GREGORY B. HLADKY, ghladky@courant.com

The Hartford Courant

8:33 PM EDT, April 9, 2014

Legislation to ban the sale or use of genetically modified lawn seed in Connecticut won state Senate approval Wednesday even though GMO grass isn't expected to be available here for at least one to two years.

The bill had the strong support of the Senate's top Democratic leader, Donald Williams Jr. of Brooklyn. But the legislation now heads to the House, where it faces opposition from that chamber's top Democrat, House Speaker Brendan Sharkey of Hamden, a fact likely to derail the bill.

Questions about what the House would do with the GMO seed ban didn't deter its Senate supporters, nor did claims by critics that such a prohibition was premature and unsupported by scientific evidence. The bill passed the Senate on a mostly party-line 25-11 vote, with three Republicans voting in favor.

Advocates of the ban warned that use of the herbicide- and pesticide-resistant GMO grass seed would encourage homeowners and businesses to use far more potentially harmful weed-killing chemicals on their lawns.

"One of the great threats to us in this country today is the invasion of pesticides," said state Sen. Edward Meyer, D-Guilford. He said allowing the use of GMO seeds in this state would result in the use of "huge quantities of pesticides" because homeowners could spread those chemicals all over their lawns without damaging the grass.

Williams said the GMO seeds being developed by Monsanto and Scott's make the grass resistant to the popular weed-killer Roundup. The primary herbicide in Roundup is glyphosate, which some studies have linked to a variety of pollution and health problems.

"All of the organic farmers I've talked to are wildly in favor of this [ban]," Williams said. He explained the great fear of organic farmers is that the GMO grass could spread to their properties and crops, while environmentalists worry about the pollution effects of increased herbicide use.

Opponents of the ban said the scientific evidence is unclear on GMO grass and that there is the possibility that it could result in less use of pesticides, herbicides and fertilizers.

Senate Republican Leader John McKinney of Fairfield urged lawmakers to adopt a two-year moratorium on the sale of GMO seed rather than an outright ban. He said the state should "take a more cautious approach" and require further study before enacting a ban.

The Senate rejected McKinney's proposal on a 23-13 vote.

State Sen. John A Kissel, R-Enfield, warned that a ban on GMO seed could hurt many of the sod farmers in his region by limiting their access to new technology to improve their farms and sales.

Other Republicans protested that the GMO seed ban hadn't had a formal legislative hearing.

The most important opposition to the ban, however, may be Sharkey's. He effectively controls what legislation will come up for a vote in the House.

Sharkey said he's concerned about bringing up a potentially controversial bill with just a month left in this legislative session. "I'm concerned about enacting legislation this year that looks to preemptively ban a product that doesn't yet exist without allowing the public and experts to weigh in," Sharkey said.

Connecticut last year became the first state in the nation to require the labeling of GMO food products, but made the law conditional on passage of similar legislation in at least four other states with populations totaling 20 million.

MOMS ACROSS AMERICA

Comments On Glyphosate Results

GLYPHOSATE TEST RESULTS

Glyphosate Testing Full Report: Findings in American Mothers' Breast Milk, Urine and Water.

Conducted by Moms Across America  **and Sustainable Pulse** 

April 7, 2014

Zen Honeycutt, Moms Across America | Henry Rowlands, Sustainable Pulse

Supporter: Lori Grace, Environmental Arts & Research

Download pdf of report here

Contents:

Press Release
What is Glyphosate?
Quotes from Scientists on Testing
Quotes from Mothers on Testing

Testing Results – Tables / Maps
Contacts
References

(1) World's Number 1 Herbicide Discovered in U.S. Mothers' Breast Milk

Urine Testing also Shows Levels over 10 Times Higher than in Europe

Water Testing shows 70% of American household's drinking water positive for above detectable levels

In the first ever testing on glyphosate herbicide in the breast milk of American women, Moms Across America and Sustainable Pulse have found 'high' levels in 3 out of the 10 samples tested. The shocking results point to glyphosate levels building up in women's bodies over a period of time, which has until now been refuted by both global regulatory authorities and the biotech industry.

The levels found in the breast milk testing of 76 ug/l to 166 ug/l are 760 to 1600 times higher than the European Drinking Water Directive allows for individual pesticides **(Glyphosate is both a pesticide and herbicide)**. They are however less than the 700 ug/l maximum contaminant level (MCL) for glyphosate in the U.S., which was decided upon by the U.S. Environmental Protection Agency (EPA) based on the now seemingly false premise that glyphosate was not bio-accumulative.

Glyphosate-containing herbicides are the top-selling herbicides in the world and are sold under trademarks such as Monsanto's 'Roundup'. Monsanto's sales of Roundup jumped 73 percent to $371 million in 2013 because of its increasing use on genetically engineered crops (GE Crops).

The glyphosate testing commissioned by Moms Across America and Sustainable Pulse, with support from Environmental Arts & Research, also

analyzed 35 urine samples and 21 drinking water samples from across the US and found levels in urine that were over 10 times higher than those found in a similar survey done in the EU by Friends of the Earth Europe in 2013.

The initial testing that has been completed at Microbe Inotech Labs, St. Louis, Missouri, is not meant to be a full scientific study. Instead it was set up to inspire and initiate full peer-reviewed scientific studies on glyphosate, by regulatory bodies and independent scientists worldwide.

The initial testing was done using ELISA tests and due to a high minimum detection level in breast milk and urine, it is possible that even those samples which tested negative contained 'worrying' levels of glyphosate.

Moms Across America Founder and Director, Zen Honeycutt, stated Monday, "When I was told by several doctors and labs that I could not test my own or my children's urine for the most widely used herbicide in the world over a year ago, I became determined to find a way. Parents and citizens deserve the ability to be able to take care of themselves and their families by finding out if herbicides could be impacting their health. The purpose of this glyphosate testing project is to shed light upon the presence of glyphosate in our water, children's bodies and mother's breast milk, hopefully inspiring further scientific studies to support the world in being a healthy, safe place to live.

> **"It is important to note that the mothers and supporters who participated in this project are mostly familiar with GMOs and glyphosate. The majority of them have been trying to avoid GMOs and glyphosate for several months to two years, so the findings are alarming. We can only wonder what the levels of glyphosate are in those who are not aware of GMOs and glyphosate," Honeycutt added.**

High Glyphosate Levels – Danger for Infants?

There is currently no regulatory limit for the amount of glyphosate in breast milk anywhere in the world. However, the EPA has set a legally enforceable maximum contaminant level (MCL) for glyphosate of 700 ug/l in drinking water, which is 7,000 times higher than the MCL in Europe.

Monsanto and regulatory bodies worldwide have based all of their regulations on the assumption that glyphosate is not bio-accumulative. Senior Monsanto scientist, Dan Goldstein, even recently stated (1) , **"If ingested, glyphosate is excreted rapidly, does not accumulate in body fat or tissues, and does not undergo metabolism in humans. Rather, it is excreted unchanged in the urine."**

The discovery of levels of glyphosate in breast milk that are much higher than any reported results for urine samples is a source of concern to both the general public and government regulators worldwide, as the data suggests that glyphosate is bio-accumulative; **building up in people's bodies over a period of time.**

Earth Open Source Research Director Claire Robinson said, "Regulators and industry always say it is the dose that makes the poison, and even the increasing levels of glyphosate currently found in food and feed and the environment are not a problem. However, that argument only holds true if glyphosate doesn't build up in the human body and is excreted as fast as we take it in. These breast milk results suggest glyphosate may bio-accumulate. That means that our body tissues might be exposed to higher levels than the so-called safe levels set by regulators. So the regulations are not protecting us."

From a total of 10 samples sent in by mothers from states across the U.S., 3 women had detectable levels of glyphosate in their breast milk. The highest glyphosate level was detected in a mother from Florida (166 ug/l) and the other two mothers with 'positive' results were from Virginia (76 ug/l) and Oregon (99 ug/l).

> **Dr Angelika Hilbeck, senior scientist at the Institute of Integrative Biology in Zurich, stated,**
>
> **"If confirmed in a full investigation, it seems that glyphosate has become a ubiquitous chemical in terms of presence and persistence. This data also offers a first indication of potential accumulation in the human body, giving newborns a substantial dose of synthetic chemicals as a 'gift' for their start into life, with unknown consequences. This is reckless and irresponsible conduct in a democratic society, which still has a living memory of previous reckless chemical contaminations, such as DDT. It seems we either did not learn, or we have forgotten, our lessons from Rachel Carson!"(2)**

Honeycutt added, "Moms Across America feels very strongly that breast milk should still be the number one choice for mothers and certainly preferred over GMO soy formula ingredients. We just urge all mothers to eat as organic as possible, especially avoiding meat, dairy, oils and grains that are sprayed with glyphosate at harvest as a drying agent."

"What we have found encouraging is that the women who have been eating organic and non-GMO food only, for several months to two years, did not find detectable levels of glyphosate in their breast milk."

Why Are Glyphosate Levels in Urine Higher than in Europe?

In 2013 people in 18 countries across Europe were found to have traces of glyphosate in their urine by a test commissioned by Friends of The Earth Europe (3). The maximum levels of glyphosate found in the tests ranged from 0.16 ug/l in Switzerland to 1.82 ug/l in Latvia.

Shockingly, the new US testing by Moms Across America and Sustainable Pulse, with support from Environmental Arts & Research, found maximum glyphosate levels in urine over 8 times higher than those found in Europe.

From the 35 samples received from across the U.S., 13 samples were above the minimum detectable level. The three highest levels were all found in women, with the highest in Oregon (18.8 ug/l). Other positive results were found in samples from the states of California, Washington, Maryland, Colorado and Hawaii.

Experts point to the GE Crop industry as being to blame for the results in both breast milk and urine, due to the amount of glyphosate used on 'Roundup-Ready GE Crops' in the U.S.

The U.S. has a high percentage of its farmland controlled by the GE crops industry, with many varieties of GE soybeans, GE corn, GE cotton and others, whereas Europe has only allowed one GE Crop – Monsanto's MON810 maize – which is still not grown in most EU states due to health and environmental concerns.

A 2012 study published by Washington State University research professor Charles Benbrook (4) found that the use of glyphosate in the production of three genetically modified herbicide-tolerant crops - cotton, soybeans and corn - has increased. Benbrook's analysis was the first peer-reviewed, published estimate of the impacts of genetically engineered (GE) herbicide-resistant (HT) crops on pesticide use.

Benbrook's response to the findings: "Most genetically engineered soybeans now moving through trade channels worldwide contain 2 ppm to over 10 ppm of glyphosate plus its major metabolite, AMPA. These are extraordinarily high residues that raise concerns, given that many people are exposed to glyphosate through drinking water, the air, and a variety of foods. I am particularly worried by exposures during pregnancy and through the first years of a child's life, when the risk of harm to developing organ systems is greatest. More research is urgently needed on glyphosate's capacity to disrupt normal development," Benbrook stated.

Glyphosate in U.S. Drinking Water

In this initial testing phase 21 samples of drinking water were tested for glyphosate from across the Unites States individually by Moms Across

America supporters.

13 of the samples contained glyphosate levels of between 0.085 ug/l and 0.33 ug/l. This is well below the levels found in both urine and breast milk but is still cause for concern, as the European (EU) maximum allowed level for glyphosate in drinking water is 0.1 ug/l.

Regulatory Bodies Urged to Act – Further Testing Needed

The US Environmental Protection Agency (EPA), U.S. Department of Agriculture (USDA), European Food Safety Authority (EFSA), Food Standards Australia New Zealand (FSANZ) and other regulatory bodies around the world are being urged to act following the release of this initial testing data, to prevent what is a dangerous public health situation.

Sustainable Pulse Director Henry Rowlands stated, "Regulatory bodies and governments worldwide need to act fast to ban all glyphosate-based herbicides as a temporary measure, while further long-term testing is completed by both them and independent scientists. This is the only way that they can regain the trust and protect the health of mothers, infants and the general public as a whole."

"It was a huge mistake by both the U.S. government and the biotech industry to promote and release products without long-term independent studies. What we are now looking at with glyphosate-based herbicides is a similar situation to what we all faced in the 20th Century with PCBs, DDT and Agent Orange," Rowlands concluded.

Due to the testing results and skyrocketing health issues, as a matter of precaution, Moms Across America calls for a cease and desist of the practice of spraying glyphosate on GE foods and as a drying agent on food crops, increasing the consumption of glyphosate in our food, including but not limited to, wheat, corn, soy, sugar, rice, dry peas and beans and tea. The EPA lists over 160 foods with allowable levels of glyphosate that are unacceptable to mothers.

Moms Across America and Sustainable Pulse are also calling for:

Adequate long-term independent testing to ensure that glyphosate herbicide formulations as sold and used are not persistent, bio-accumulative or toxic. This testing must include the outcomes most relevant to children's health. The U.S. Congress should supply funding for urgently needed long-term independent research on glyphosate herbicide formulations, including their health effects, how they get into the human body, and current levels of accumulation in people, animals and the environment. Studies performed

for regulatory authorisation up until now have only tested the isolated ingredient glyphosate, not the complete formulations as sold and used, even though the formulations have been found in many studies to be much more toxic than the isolated ingredient. Also these studies are funded by the agrochemical industry, i.e. they are not independent. Finally, they are kept secret under commercial confidentiality rules, so cannot be scrutinized by independent scientists and the public.

PCB Similarities

This case of finding high levels of glyphosate in breast milk is a re-run of the Polychlorinated biphenyls (PCBs) scandal (5) in the 1970s, which ended up in the toxic chemical compound's production being banned by the U.S. Congress in 1979.

Before the ban Monsanto, the only North American producer, had marketed PCBs under the trade name Aroclor from 1930 to 1977 and had insisted that it was not toxic.

It was not until levels of PCBs in breast milk were found to be 10 times those in blood, obtained from residents in the Osaka Prefecture of Japan (6), that the toxicity of PCBs was questioned by regulators, leading to the 1979 ban.

According to the EPA, PCBs, which were widely used for over 40 years as dielectric and coolant fluids, have now been shown to cause cancer in humans.

Is it not time that regulators learned lessons from past mistakes?

(2) What is Glyphosate?

Glyphosate is the presumed active ingredient of Roundup and other commercial glyphosate herbicide formulations. Glyphosate was developed by John E. Franz of Monsanto Company. It was first used in 1972 as a non-selective, water-soluble herbicide with a specific mechanism of action: the directed interruption of plant development through metabolic poisoning. The chemical is a specific inhibitor of the plant enzyme 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS), which does not exist in mammals, including humans. Based on this known mechanism of toxicity, the herbicide has been claimed to have low toxicity for mammalian species. However, glyphosate and its formulations have other mechanisms of toxicity.

Monsanto's US patent for Roundup expired in 2000 and it ceased production in 2007. Other glyphosate herbicides manufactured by Monsanto, such as PROMAX and WeatherMAX, are in current use. Moreover, numerous generic

glyphosate formulations (e.g. Clearout 41) are now produced by at least 100 manufacturers worldwide.

Glyphosate is:

#1: A Patented Antibiotic – USPTO # 7777136. Leading to concerns about possible harm, including the killing of beneficial gut bacteria which causes immune system damage.

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&u=%2Fnetahtml%2FPTO%2Fsearch-adv.htm&r=1&p=1&f=G&l=50&d=PTXT&S1=7771736&OS=7771736&RS=7771736

#2: Chelating Agent - Although glyphosate can be rapidly immobilized in soil (also spray tank mixtures, and plants) through chelation with various cat-ions (Ca, Mg, Cu, Fe, Mn, Ni, Zn), it is not readily degraded and can accumulate for years (in both soils and perennial plants). Glyphosate's chelation properties may lead to possible harm such as vitamin and mineral deficiencies.

http://www.archpatent.com/patents/3160632

Glyphosate has been shown in several recent studies to be an endocrine disruptor. According to the National Institutes of Health, endocrine disruptors could have long-term effects on public health, especially reproductive health. And the "dose makes the poison" rule does not apply to endocrine disruptors, which wreak havoc on our bodies at low doses.

Most genetically modified (GM) crops are engineered to tolerate the herbicide Roundup, Monsanto's best-selling product. The main active ingredient in Roundup is glyphosate. A number of glyphosate-resistant crops are also produced by Monsanto.

Health Risks

Laboratory and epidemiological studies confirm that Roundup and glyphosate pose serious health and environmental hazards, including possible endocrine (hormone) disruption, cell death, DNA damage, cancer, birth defects, and neurological disorders.

Some of these toxic effects are observed at low, realistic doses that could be found as residues in food and feed crops and in drinking water.

People are exposed to glyphosate though contaminated food, water and air, often as a result of the herbicides application to fields. This is not only the case in rural areas, where 'Roundup Ready' GM crops are grown on a large scale. Glyphosate-based herbicides are widely used by municipal authorities on roadsides, pavements, and in public parks and school grounds. It is also widely used by home gardeners.

Roundup and glyphosate and their residues have been detected in previous testing in air, rain, groundwater and even circulating in women's blood.

Not Enough Safety Tests

Roundup and other glyphosate herbicide formulations as sold and used have been found in studies to be more toxic than the isolated ingredient, glyphosate. However, only glyphosate alone is tested in long-term safety tests for regulatory authorizations. This is a fundamental problem affecting all pesticide authorizations.

The 'safe' dose for Roundup exposure set by regulators is not based on up-to-date objective evidence. So, current regulations do not protect the public.

The chemicals used in the GM model of farming are toxic, and the model of farming itself is unsustainable and damaging to the environment – with an increase in herbicides significantly increasing pollution and health risks for citizens, and contributing to biodiversity loss. The only people who stand to gain from this model are those that produce the herbicide-resistant crop the chemicals required to grow them.

The chemicals used in the GM model of farming are toxic, and the model of farming itself is unsustainable and damaging to the environment – with an increase in herbicides significantly increasing pollution and health risks for citizens, and contributing to biodiversity loss. The only people who stand to gain from this model are those that produce the herbicide-resistant crops and the chemicals required to grow them.

(3) Quotes from Scientists on Testing

Dr. Don M. Huber, Professor Emeritus, Purdue University.

"It is well established in the scientific literature that glyphosate disrupts the endocrine hormone system, and is toxic to liver and kidney tissues, a strong mineral chelator, and a potent antibiotic that kills essential microorganisms in the gastro-intestinal tract. The levels observed in breast milk and urine in

this preliminary survey indicate that intake of this chronic toxin is highly biologically significant and almost 100 times the amounts documented in peer-reviewed scientific studies to cause birth defects, kidney and liver damage, hormonal disruption, and predispose to cancer. Much higher levels of glyphosate in breast milk than urine indicate a concentration factor that can especially compromise the health and development of an infant through direct toxicity, deprivation of essential mineral nutrients, and dysbiosis of the microbiome essential for immune, neural and physical development. Additional testing is essential to confirm the validity of this data on a larger scale if we are to avoid compromising the health and well-being of an entire generation."

Jack Heinemann, Professor of genetics and molecular biology in the School of Biological Sciences at the University of Canterbury, Christchurch, New Zealand.

> "We have an inadequate knowledge of the effects of real life exposures to the many potentially and actually toxic chemicals that are part of daily modern life. This snapshot of just one pervasive chemical, glyphosate, in the fluids of human bodies is therefore important and timely. No single study of this type or scale is enough to determine if this chemical alone or in combination with the many other "approved as safe if exposed below certain amounts" cause harm. But that this study was initiated by a grassroots campaign rather than government or funded by the industries that profit from mass release of these compounds, says to me how neglected this area of public good research is.
>
> "Glyphosate was measured in parts per billion in urine and breast milk. Are these levels too low to cause harm in people after a lifetime of constant low level exposure? Possibly, but possibly not.
>
> "What does this mean for women who choose to breastfeed? In my opinion, the many good things that breastfeeding does for babies far outweighs the risk of the low level exposures to this pesticide. But it is also my opinion that, until such low level exposures to nursing babies can be determined to be safe there should be an obligation placed on the pesticide industry and the relevant government agencies to reduce exposures that are sufficient to cause accumulation of the pesticide in breast milk.
>
> **"Urban lawns and roadsides as well as the farm in America and many other places have become addicted to these agrochemicals. There is far too little emphasis on providing**

services to agriculture that reduce this dependency and too much emphasis on innovation dependent upon it. Let's wean the farmer from these chemicals rather than our babies from their milk."- Heinemann

Anthony Samsel, a former private environmental U.S. government contractor as well as a member of the Union of Concerned Scientists

"Everyone eating the western diet of food grown, sprayed and desiccated with Monsanto's Roundup herbicide can expect to find its active ingredient glyphosate in their body. Glyphosate chelates chemical elements important to our existence, disrupts vitamin synthesis and detoxification enzymes like glutathione and CYP 450 enzymes, as well as many essential amino acids. Glyphosate is an antibiotic, capable of killing hundreds of species of bacteria which are directly responsible for our immune function and overall health. It is a chronic toxin, a chemical weapon like no other, which is capable of killing organisms both directly and indirectly. Monsanto's Roundup-glyphosate based herbicide may in fact be, the most disruptive chemical to our biology and our environment.

"The glyphosate in humans data recently collected from volunteers across the USA serves as a snapshot of the general population... Breast milk samples contained levels from 76 to 166 ug/L, levels that can cause harm. The thought of babies receiving glyphosate through their mother's milk is particularly troubling as it demonstrates that there is no escape from this antibiotic chemical.

"If the HPLC method was used (High Pressure Liquid Chromatography), it would have yielded an increased statistical result, as this method has a lower range of detection. However, there is a higher cost associated with the method which would have made it prohibitive for many participants. The result of my own urine test in this group was below the detection level, as were over 50% of the participants. Dietary exposure is an obvious function in this regard. Not all glyphosate ingested is passed in the urine and feces, a small portion is metabolized to AMPA another toxin. The remainder of the glyphosate continues to circulate in the blood and cerebral fluid where it travels to the cells and causes cumulative, chronic damage. It is deposited in the body's tissues which include but are not limited to the liver, kidneys, pancreas, heart and other muscles.

"We have got to get glyphosate out of the food supply. Our

health and the health of those we love may be in grave danger from exposure to this chemical. It is urgent that people know and time is of the essence. Every moment lost will be a new health casualty."- Samsel

(4) Quotes from Mothers on Testing

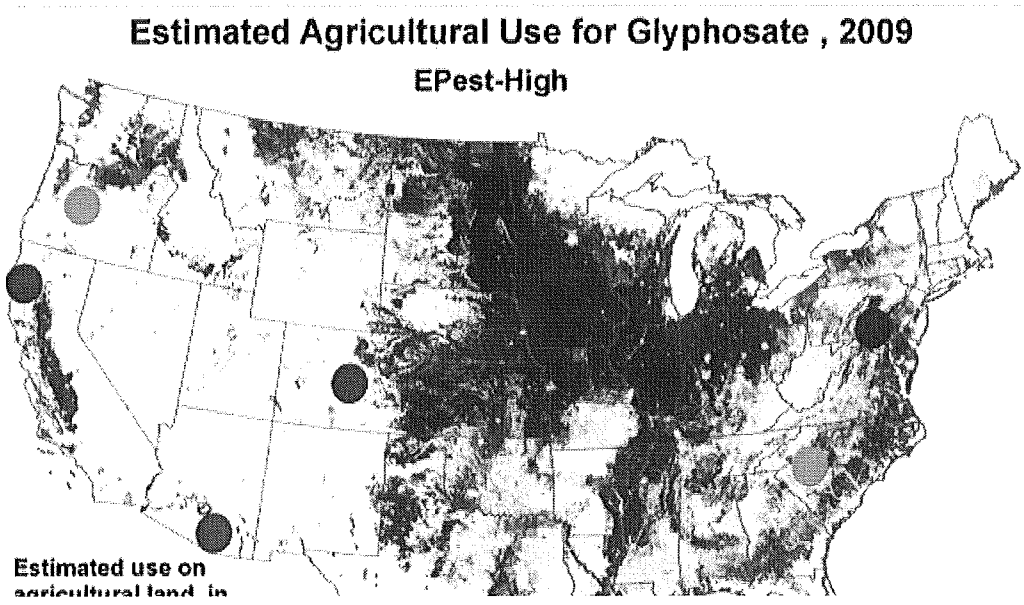
Jessica M. from Virginia:

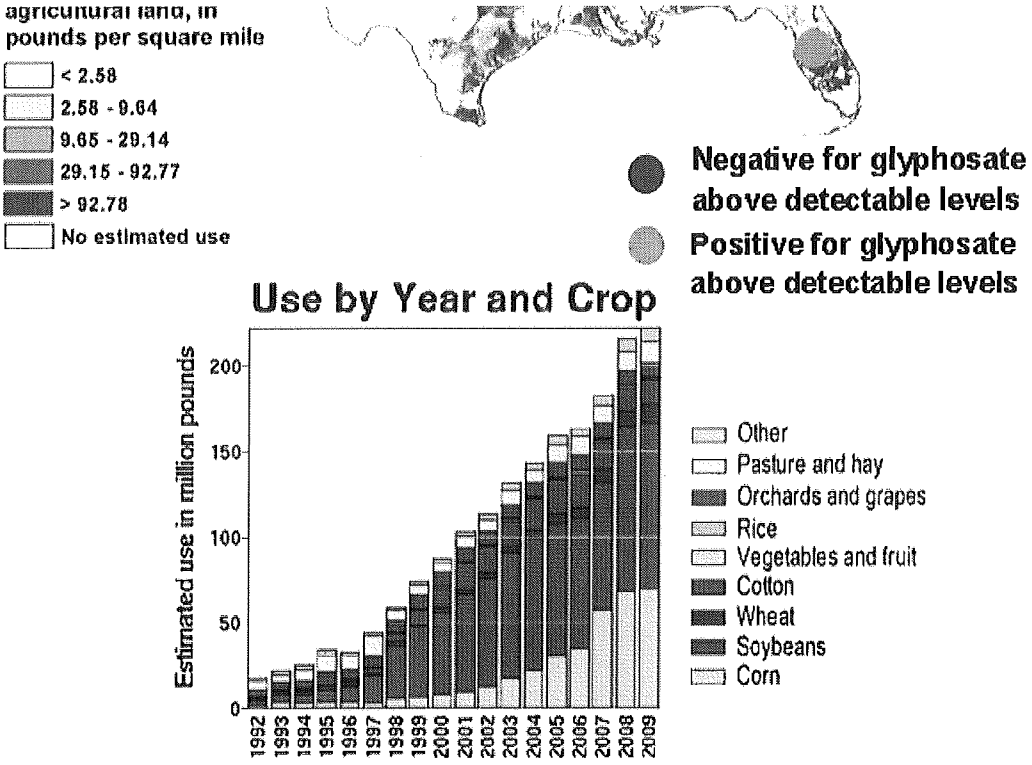
"It is frightening to see any glyphosate in my body, especially in my breast milk that will then contaminate my son's growing body. It's particularly upsetting to test positive for glyphosate because I go to great lengths to eat organic and GMO free. I do not consume any meats or seafood and only very rarely eat dairy. This really shows me, and should show others, just how pervasive this toxin is in our food system."

Rachel T. from Illinois:

"I tested negative. I am relieved to know that the time, money, and effort we have spent to source good quality, organic, GMO-free food over the past several years has paid off. This should offer hope and encouragement to many families; that what we eat truly does affect us. I hope that someday in the future the knowledge of how to source these foods becomes more main stream so that others can benefit and heal their bodies from the countless health problems caused by GMO laden foods."

Most recent map of glyphosate use in America with Breast Milk results. Red-Negative, Green Positive.




agricultural land, in pounds per square mile
< 2.58
2.58 - 9.64
9.65 - 29.14
29.15 - 92.77
> 92.78
No estimated use
Negative for glyphosate above detectable levels
Positive for glyphosate above detectable levels
Use by Year and Crop
Estimated use in million pounds
0
50
100
150
200
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Other
Pasture and hay
Orchards and grapes
Rice
Vegetables and fruit
Cotton
Wheat
Soybeans
Corn

ng.

Moms Across America discovered that the quantity of local glyphosate spraying at farms does NOT correlate to positive or negative glyphosate detectable levels in mothers, suggesting the glyphosate is coming from another source, such as national brands of food, which are not connected to local environmental conditions. Manufacturers must be responsible and conduct further testing.

(5) Similar testing on Urine in Europe

Two full-scale glyphosate testing projects have been carried out in Europe over the last year on urine in humans.

The first was organized by Friends of the Earth Europe and the second was led by Dr. Monika Krüger of the University of Leipzig in Germany.

When looking at the data from both of these tests please keep in mind that the **U.S glyphosate testing has already detected glyphosate levels in urine of between 8.1 ug/l and 18.8 ug/l** with a much smaller survey.

Determination of Glyphosate residues in human urine samples from 18 European countries: (Medical Laboratory Bremen commissioned by Friends of the Earth Europe)

http://www.gmoevidence.com/wp-content/uploads/2013/06/glyphosate_studyresults_june12.pdf

In this study, 182 urine samples received from 18 European countries were analyzed for glyphosate and AMPA residues using a new GC-MSMS method. With a LOQ of 0.15 ug/l, on average 44 % and 36 % of the urine samples analyzed were found to contain quantifiable levels of glyphosate and AMPA,

respectively. However the frequency of detection calculated for each individual EU-state ranged from 10% to 90%. **The highest glyphosate concentration was 1.8 ug/L (Latvia),** the highest AMPA concentration was 2.6 ug/L (Croatia). All in all 12 (6.6%) participants of the study significantly exceeded the tentative reference value of 0.8 ug/L for glyphosate.

Detection of Glyphosate Residues in Animals and Humans: Dr. Monika Krüger

http://omicsonline.org/open-access/detection-of-glyphosate-residues-in-animals-and-humans-2161-0525.1000210.pdf

In this study glyphosate residues were tested in urine and different organs of dairy cows as well as in urine of hares, rabbits and humans using ELISA and Gas Chromatography-Mass Spectroscopy (GC-MS). Cows kept in genetically modified free area had significantly lower glyphosate concentrations in urine than conventional husbandry cows. Also glyphosate was detected in different organs of slaughtered cows as intestine, liver, muscles, spleen and kidney. Fattening rabbits showed significantly higher glyphosate residues in urine than hares.

Glyphosate was significantly higher in the urine of humans who didn't eat organic food. Furthermore, chronically ill humans showed significantly higher glyphosate residues in urine than in the healthy population.

The glyphosate levels detected Kruger's study were all under 2 ug/l in human urine.

(6) Independent Science on Glyphosate

There have been a large number of independent studies carried out on glyphosate and Roundup which show why the public and media should be concerned over the possible harm that the herbicide is causing.

Below is a small selection of these studies. For a wider selection please visit here: http://www.gmoevidence.com/location/roundup-evidence/

2014: Glyphosate, Hard Water and Nephrotoxic Metals: Are They the Culprits Behind the Epidemic of Chronic Kidney Disease of Unknown Etiology in Sri Lanka?: Dr. Jayasumana (Sri Lanka)

The Sri Lankan President has put a ban on all glyphosate-based pesticides following this study.

The study published in the International Journal of Environmental Research and Public Health links glyphosate (Roundup) to a series of mysterious epidemics of fatal chronic kidney disease of unknown origin (CKDu) affecting several poor farming regions around the world. The current death toll from CKDu is 20 000 and the number of those with the disease number over 400 000.

Full Paper Here: http://www.mdpi.com/1660-4601/11/2/2125

2013: Glyphosate induces human breast cancer cells growth via oestrogen receptors: Dr. Thongprakaisang (Thailand)

This study shows that glyphosate exerted proliferative effects only in human hormone-dependent breast cancer, T47D cells, but not in hormone independent breast cancer, MDA-MB231 cells, at 10-12 to 10-6 M in estrogen withdrawal condition.

Full Paper Here: http://www.ncbi.nlm.nih.gov /pubmed?term=Thongprakaisang%20S%5BAuthor%5D&cauthor=true& cauthor_uid=23756170

2010: Glyphosate Based Herbicides Produce Teratogenic Effects on Vertebrates by Impairing Retinoic Acid Signalling: Dr. Andres Carrasco (Argentina)

This study, by a team led by Prof Andres Carrasco at Buenos Aires University , found that glyphosate and Roundup cause birth defects in frog and chicken embryos at extremely low doses.

http://www.gmwatch.eu/images/pdf/Carrasco_research_paper.pdf

More information on glyphosate's possible links to birth defects can be found here: http://www.earthopensource.org/files/pdfs/Roundup-and-birth-defects /RoundupandBirthDefectsv5.pdf

2012: Teratogenic Effects of Glyphosate-Based Herbicides: Divergence of Regulatory Decisions from Scientific Evidence: Dr. Michael Antoniou (UK)

Malformations were seen from the administration of glyphosate to rabbits and rats in studies commissioned by industry for regulatory purposes. These effects were not found only at high maternally toxic doses but also at lower

doses. Statistical significance was not always achieved at lower doses because too few animals are used in such tests. "Historical control data" and other excuses were used to dismiss the findings.

Full paper here: http://omicsonline.org/2161-0525/2161-0525-S4-006.php?aid=7453

2004: Neural Tube Defects and Maternal Residential Proximity to Agricultural Pesticide Applications: Dr. Rull (US)

This study evaluated the effects of maternal environmental exposure to 59 agricultural pesticides on neural tube defects (NTDs) in babies born in California between 1987 and 1991. Maternal residential proximity within 1,000 meters of crop pesticide applications occurring around the month of conception was assessed using a model based on linking California Pesticide Use Reports (PUR) and land-use survey maps. The study found an association between glyphosate exposure and anencephaly, a type of neural tube defect.

Full paper here: http://journals.lww.com/epidem/Fulltext/2004/07000/Neural_Tube_Defects_and_Maternal_Residential.499.aspx

2002: Birth defects, season of conception, and sex of children born to pesticide applicators living in the Red River Valley of Minnesota, USA: Dr. Garry (U.S.)

An epidemiological study carried out in Minnesota, USA found that the children of pesticide applicators exposed to glyphosate herbicides had an increased incidence of neurobehavioral disorders, including ADHD (attention deficit hyperactivity disorder). This suggests that glyphosate herbicide impacts neurological development.

Full paper here: http://www.ncbi.nlm.nih.gov/pubmed/12060842

2007: Evaluation of DNA damage in an Ecuadorian population exposed to glyphosate: Dr. Paz-y-Miño (Ecuador)

Ecuadorian people exposed to aerial glyphosate herbicide spraying on coca crops showed a much higher degree of DNA damage in blood cells than a control population living 80 km away. The researchers ruled out tobacco, alcohol, non-prescription drugs and asbestos as causes. None of the individuals had used or been exposed to other herbicides or pesticides when

the samples were taken. The study also found acute poisoning reactions to the glyphosate spraying, including intestinal pain and vomiting, diarrhoea, fever, heart palpitations, headaches, dizziness, numbness, insomnia, burning eyes, blurred vision, difficulty in breathing, and skin rash.

Full paper here: http://www.scielo.br/pdf/gmb/v30n2/a26v30n2.pdf

1997: Male Pesticide Exposure and Pregnancy Outcome: Dr Savitz (Canada)

A study of farming families in Ontario, Canada found a higher than normal rate of late miscarriages and pre-term deliveries associated with glyphosate exposure.

Full paper here: http://aje.oxfordjournals.org/content/146/12/1025.full.pdf

2005: Differential effects of glyphosate and roundup on human placental cells and aromatase: Dr Seralini (France)

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257596/

2006: Time- and Dose-Dependent Effects of Roundup on Human Embryonic and Placental Cells: Dr Seralini (France)

http://www.gmoseralini.org/wp-content/uploads/2013/01/Benachoural.AECT_2007.pdf

In these in vitro experiments, glyphosate was found to be toxic to human placental cells and Roundup formulation was more toxic. Glyphosate and Roundup damaged human embryonic cells and placental cells in vitro in concentrations well below those recommended for agricultural use. The study's authors concluded that Roundup may interfere with human reproduction and embryonic development.

(7) Testing Method

Glyphosate Testing Method: Glyphosate Plate Assay

The testing of drinking water, urine and breast milk was carried out by Microbe Inotech Laboratories, Inc. (MiL inc.)

For the detection and quantitation of glyphosate in water (groundwater,

surface water, well water), urine and breast milk, the MiL inc. uses a 96 well microtiter plate assay. For soil, crop, and foods, additional preparation steps are required but can be processed at a small additional fee. This assay applies the principles of enzyme linked immunosorbent assay methodology (ELISA) to the determination of glyphosate.

The sample to be tested is derivatized and then added, along with an antibody (binding protein) specific for glyphosate to microtiter wells coated with Goat Anti-Rabbit Antibody and incubated for 30 minutes. A glyphosate enzyme conjugate is then added.

This particular format is known as a competitive ELISA assay since, at this point in the procedure, a competitive reaction occurs between the glyphosate which may be in the sample and the enzyme labeled glyphosate analog for the antibody binding sites on the microtiter well.

The reaction is allowed to continue for sixty minutes. After a washing step and addition of a substrate (color solution), a color signal (blue color) is generated. The presence of glyphosate is detected by adding the "Color Solution", which contains the enzyme substrate (hydrogen peroxide) and the chromogen (3,3',5,5'-tetramethylbenzidine). The enzyme-labeled glyphosate bound to the glyphosate antibody catalyzes the conversion of the substrate/chromogen mixture to a colored product.

After an incubation period, the reaction is stopped and stabilized by the addition of a diluted acid (Stopping Solution). Since the labeled glyphosate (conjugate) was in competition with the unlabelled glyphosate (sample) for the antibody sites, the color developed is inversely proportional to the concentration of glyphosate in the sample.

Six concentrations (0, 0.75, 0.2, 0.5, 1.0, 4.0 ppb) of glyphosate standards in distilled water with a non-mercury preservative and stabilizers are used to generate a standard response curve. A control solution at approximately 0.75 ppb of glyphosate is included in every run and treated in the same manner as unknown samples to serve as a positive control within the assay. The color absorbance is read using a microplate reader (see Figure).

Any results obtained with a calculated glyphosate concentration of less than 0.05 ppb is assumed to be below the detection limit of the assay with glyphosate reported as being absent (7.5 ppb detection limit for Urine) (75 ppb detection limit for Breast Milk).

(8) Test Results

Test Results for the presence of Glyphosate in American Mother's Breast Milk

Partial display. Interactive Map at **http://batchgeo.com /map/9bcabad4abf8e4c4fafa883251c6754d**

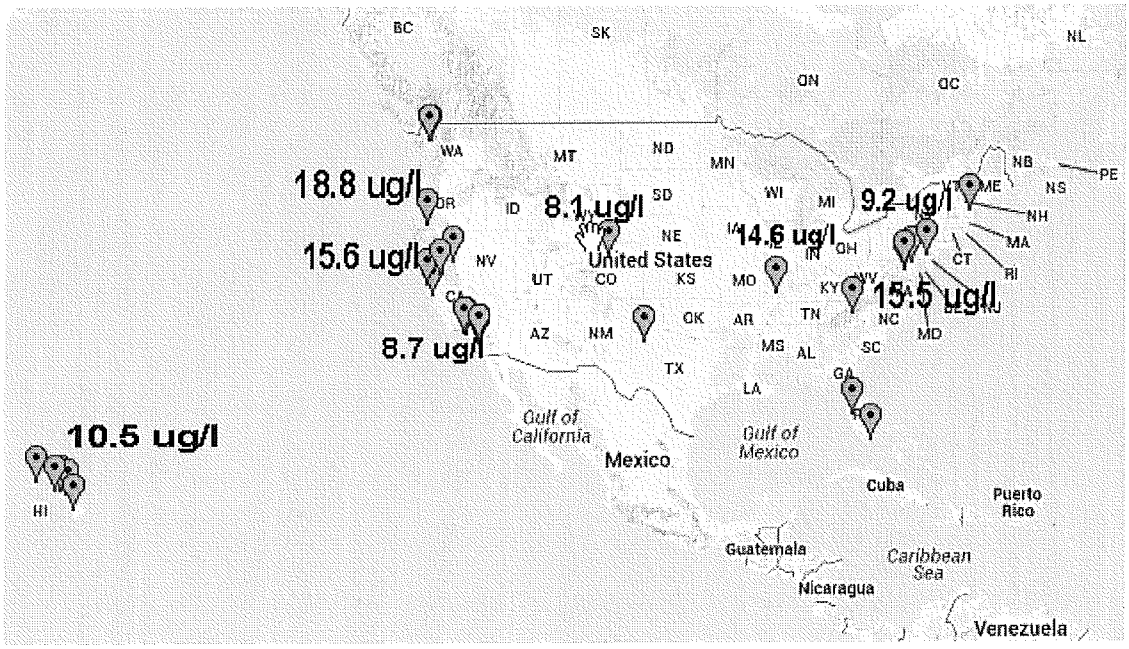
Test Results for the presence of Glyphosate in American Mothers' Breast Milk

Project #	Sample #	Test Results	Age	Gender	Weight	State	Zip
062A	1	<75 ug/L	26	F	105	IL	62521
062B	1	<75 ug/L	43	F	225	NV	89109
062C	1	<75 ug/L	32	F	113	CA	95521
062D	1	<75ug/L	26	F	110	AZ	85741
062E	1	**99 ug/L**	28	F	165	OR	97202
62F	1	**76 ug/L**	22	F	100	VA	23220

062G	1	**166 ug/L**	30	F	180	FL	32726
062H	1	<75 ug/L	39	F	145	CO	80229
062I	1	<75 ug/L	29	F	130	IA	50031
062J	1	<75 ug/L	30	F	125	PA	17601

Test Results for the presence of Glyphosate in the urine of American adults and children.

Partial display. Interactive Map link to Urine Test results for glyphosate **http://batchgeo.com/map/997080dd3f0dbc59b5de665f4ea04bf1**



Of the 35 initial samples sent in 34% of the people tested positive for detectable levels of glyphosate in their urine. 85% of all participants noted that they were actively avoiding GE foods and pesticides in their diet.

Test Results for the presence of glyphosate in the urine of American people and children.

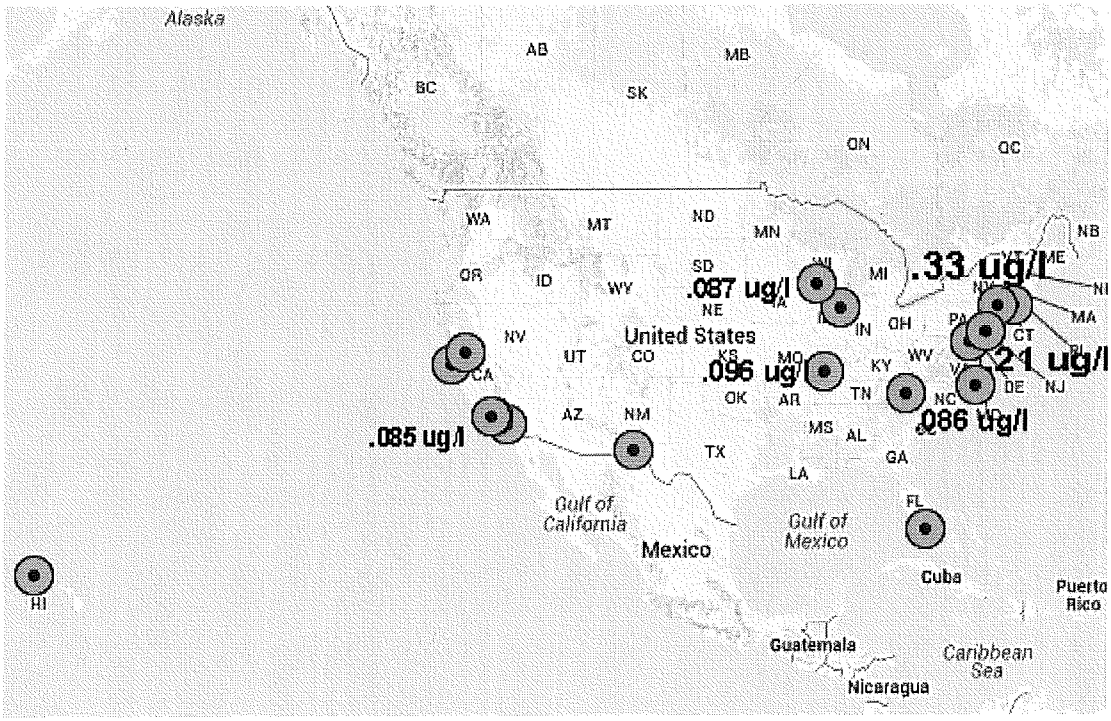
Project #	Sample	Matrix	Test	Age	Gender	Weight	State	Zip

	#	(Water/Urine)	Results			(lbs)		
glyph001	1	U	**8.7 ug/L**	8	M	52	CA	92691
glyph002	1	U	<75 ug/L	67	F	130	HI	96821
glyph004	1	U	**8.5 ug/L**	13			CA	91320
glyph007	2	U	<7.5 ug/L	44	F	180	FL	33030
glyph014	2	U	<7.5 ug/L	39	F	130	PA	19072
glyph016	2	U	**15.5 ug/L**	52	F	140	NC	28711
glyph018	2	U	**15.6 ug/L**	69	F	127	CA	95608
glyph023	1	U	**9.2 ug/L**	65	M	210	MD	20874
glyph020	3	U	<7.5 ug/L	45	F	125	MD	21022
glyph037	1	U	<7.5 ug/L	64	M	140	NH	03037
glyph 036	1	U	<7.5 ug/L	53	F	120	CA	91377
glyph 038	2	U	<7.5 ug/L	68	F	129	CA	91361

The highlighted urine glyphosate test results are after a positive glyphosate result in initial testing of one family member and then 2-6 weeks of switching to 100% organic diet. The negative detection of glyphosate coincides with the disappearance of recorded inflammation and autism symptoms in the 8 year old boy after 6 weeks of an organic diet and 2 weeks of Reverse Osmosis Filtered water which tested negative for detectable levels of glyphosate.

Test Results for the presence of Glyphosate in the water of American households.

Partial display. Interactive Map at **http://www.batchgeo.com /map/8b5b606dab90cba4e8fe828fe0dedeb5**



Test Results for the presence of Glyphosate in the water of American households.

Project #	Matrix (Water/Urine)	Level	State	Zip
glyph001	W	**0.085 ug/L**	CA	92691

glyph002	W	**0.123 ug/L**	CO	96821
glyph004	W	**0.17 ug/L**	CA	91320
glyph007	W	<0.05 ug/L	FL	33030
glyph014	W	**0.167 ug/L**	PA	19072
glyph016	W	**0.086ug/L**	NC	28711
glyph018	W	**0.087 ug/L**	WI	53588
glyph020	W	**0.140 ug/L**	CA	95608
glyph020	W	**0.151 ug/L**	CA	95608
glyph027	W	**0.212 ug/L**	MD	21022
glyph027	W	**0.116ug/L**	MD	21022
glyph028	W	<0.05 ug/L	IL	60441
glyph 036	W	<0.05 ug/L	CA	91377
glyph038	W	<0.05 ug/L	CA	91361
glyph039	W	**0.33 ug/L**	NY	12561
glyph042	W	<0.05 ug/L	CA	94920
glyph 064	W	**0.096 ug/L**	MO	63701
glyph071	W	**0.22 ug/L**		

glyph072	W	<0.05 ug/L	CT	06105
glyph080	W	<0.05 ug/L		96741
glyph082	W	<0.05 ug/L	NC	27973
glyph083	W	<0.05 ug/L	CA	92691

These results are from Multipure (.17 ug/l) and Pursanova (<.0.05 ug/l) Reverse Osmosis Sytems. Showing that not all Reverse Osmosis Systems remove glyphosate at a lower then detectable level.

(9) Contacts:

Henry Rowlands, Director, Sustainable Pulse, www.sustainablepulse.com , Skype: henry.rowlands

Zen Honeycutt, Founder and Director of Moms Across America, www.momsacrossamerica.com, info@momsacrossamerica.com, Skype: zen.honeycutt. Moms Across America is presented by the non profit CA State Grange and is a national coalition of unstoppable Moms. "Empowered Moms, Healthy Kids."

Microbe Inotech Labs, Inc. 11754 Westline Industrial Dr., St. Louis, MO 63146-3402 Phone: 1-800-688-9144 www.microbeinotech.com

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Vermont Senate Votes 26-2 for GMO Labeling

April 16th, 2014

Vermont one step closer to becoming first state to enact such a law

Burlington Free Press (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling)
by Terri Hallenbeck

MONTPELIER — The Senate gave a decisive 26-2 vote Tuesday for a bill that would require labeling of foods that contain genetically modified ingredients, a strong indication that Vermont could become the first state in the nation to enact such a law.

“We are saying people have a right to know what’s in their food,” said Senate President (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling#) Pro Tempore John Campbell, D-Windsor.

Campbell and other supporters argued that they believe they have written a bill that is legally defensible. They nonetheless created a fund in the legislation to help pay the state’s legal bills, as many assume that food manufacturers will sue.

The bill would require food sold in Vermont stores that contain genetically modified ingredients to be labeled starting July 2016. The legislation is up for another vote in the Senate Wednesday before it goes back to the House (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling#) , which passed a slightly different version last year. Gov. Peter Shumlin has indicated he’s likely to sign the bill.

Two other states — Connecticut and Maine — have passed labeling laws, but both delayed implementation until neighboring states join them, a strategy designed to insulate them from being sued. Voters in Washington and California defeated labeling measures there.

Supporters said they hoped Vermont would lead the way on the issue. “Vermont’s always first,” said Will Allen, an organic farmer from Fairlee, citing the state’s ban on slavery, passage of civil unions and same-sex marriage as other firsts.

Many foods, including an estimated 88 percent of the corn crop in the United States, contain ingredients that have plants or animals that were genetically modified, typically to increase disease resistance or extend shelf life. Opponents argue that the process may be harmful to humans. Supporters contend there is no evidence of that. Sixty countries, including the European Union, require labeling.

Sen. David Zuckerman, P/D-Chittenden, noted as he introduced the bill on the Senate floor Tuesday that questions remain about the safety (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling#) of the genetically modified foods because the U.S. Food and Drug Administration relies on testing done by the food producers rather than independent sources.

Sens. Peg Flory, R-Rutland, and Norm McAllister, R-Franklin, were the only votes of dissent Tuesday.

Flory, a lawyer, noted that Attorney General Bill Sorrell has said the state is likely to be sued. Senate Judiciary Committe Chairman (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling#) Richard Sears, D-Bennington, conceded under questioning from Flory that if Vermont loses the case, as it did with a similar law that sought to require labeling of milk containing bovine growth hormones, the legal bills are estimated to be as high as $8 million.

McAllister, a farmer, argued that labeling will do nothing but mislead consumers into believing there must be something bad about GMOs, which he believes is untrue. “This labeling bill will not tell them anything other than ‘GMO something’,” McAllister said. “This does not educate them about what they’re eating. The nutritional value is exactly the same.”

Some senators who had been skeptical of GMO labeling said they were persuaded that their constituents want the information (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling#) clarified on the food they buy. Senators said they were flooded with emails and calls from people urging them to pass the bill.

Sen. Joe Benning, R-Caledonia, said he came to view labeling of GMOs as akin to the label that tells him how many carbohydrates are in a bottle of tea. That label gives him information without declaring that carbohydrates are evil, he said. “I know what carbohydrates can do to my body,” he said. “Some people in this room that’s exactly how they feel about GMOs.”

Under the bill, Benning said, the wording declaring that a product (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling#) contains GMOs could be as small as the carbohydrate listing typically found on food packages.

Sen. Bobby Starr, D-Essex/Orleans, chairman of the Senate Agriculture Committee, said he, too, had been unenthusiastic about GMO labeling, but at every public meeting he heard from Vermonters who wanted a labeling law. “Lo and behold, GMOs would float to the top of the debate within those meetings (http://www.burlingtonfreepress.com/article/20140415/NEWS03/304150009/Vermont-Senate-votes-26-2-GMO-labeling#) ,” he said.

(http://www.linkwithin.com/)

THE SACRAMENTO BEE sacbee.com

Andy Alfaro / <252>The Modesto Bee

Bees pollinate almond trees blooming in the Modesto area in February. Tens of thousands of bee colonies died or showed damage this year after pollination.

More Information

- Taste for honey grows along with concern for bees

Beekeepers search for answers as colonies show up damaged after almond farm

pollination

By Edward Ortiz
eortiz@sacbee.com
Published: Saturday, Apr. 19, 2014 - 9:09 pm
Last Modified: Sunday, Apr. 20, 2014 - 9:07 am

As many as 80,000 bee colonies have died or been damaged this year after pollinating almond trees in the San Joaquin Valley, and some beekeepers are pointing to pesticides used on almond orchards as a possible cause.

The damaged colonies are the latest worry in the beekeeping community, which is already struggling to deal with colony collapse disorder, a phenomenon in which beekeepers open hives after pollination and find them empty, with the bees nowhere to be found.

The damaged hives are a significant agricultural issue. Ninety percent of honeybees that pollinate crops in the United States are used during the California almond bloom. And there is a cascading effect. Bees used to pollinate almond trees typically are moved to pollinate other crops, such as apples, cranberries, cherries and watermelons.

It's not clear why the damaged hives are showing up this year, as opposed to prior years.

"We're a little mystified," said John Miller, a beekeeper based in Newcastle. "We have some colonies that looked like they've been through some kind of brood die-off. It's puzzling because it is intermittent and random."

Miller keeps about 12,000 colonies of bees, which pollinate trees at almond farms in Newcastle. He said the damage he has incurred is moderate compared with what he has seen other beekeepers suffer – whole colonies damaged or dead.

Almond pollination in California requires the use of 1.6 million bee colonies, almost all brought in from other states by an army of 1,300 commercial beekeepers.

Damage to the hives this spring was so pronounced that it forced an impromptu meeting March 24 in Los Banos between beekeepers and the U.S. Environmental Protection Agency. In that meeting, 75 beekeepers weighed in and said three-quarters of their hives showed damage. That equals nearly 80,000 damaged hives, said Michele Colopy, program director with the Pollinator Stewardship Council, an advocacy group for beekeepers.

At the meeting of beekeepers, bee brokers and managers from the EPA's Office of Pesticide Programs, the practice of almond growers engaging in "tank mixing" of insecticides was raised as a major issue, Colopy said.

Almond growers typically apply one or a mix of pesticides – which can include clothianidin, dinotefuran, imidacloprid and thiamethoxam – and now are applying two new products, tolfenpyrad and cyantraniliprole, Colopy said.

She suggested that mixing certain insecticides is to blame for the damage to hives, along with the practice of applying insecticides during the early daytime hours when bees are foraging.

“Our best practices recommend almond growers avoid application of insecticides during bloom and minimize exposure to bees and pollen,” said Bob Curtis, associate director of agricultural affairs with the Almond Board of California.

The board’s recommendations include spraying at midafternoon and in the evening, Curtis said.

Los Banos beekeeper Gene Brandisaid the pesticides used by growers do not have explicit label warnings about their possible effects on bee. The EPA assessed their toxicity, but only to adult bees, and found them to be nontoxic.

“Nonetheless, these chemicals affect the bee colony by affecting the brood,” Brandi said, adding, “The damaged hives are a significant number, and enough to cause alarm.”

Liz Purchia, an EPA spokeswoman, said the agency “understands the concerns of the beekeepers and growers, and will continue to work with them.”

“There are general instructions on pesticide labels regarding tank mixing,” Purchia said. “However, EPA does not currently require any specific language for tank mixing fungicides for use on almond farms.”

Instructions on labels only direct farmers to follow the most restrictive instructions for any chemical and advise against mixing products whose labels prohibit tank mixing.

Purchia said the EPA is considering improvements in pollinator-protection language to reduce the risk that bees face from pesticides applied during the almond bloom.

State pesticide agencies may require additional label instructions for tank mixing of pesticides within their jurisdictions, Purchia said.

In California, the state Department of Pesticide Regulation oversees the use and regulation of pesticides. “The department is working with beekeepers to look into the issue,” said spokeswoman Charlotte Fadipe. “However, there is no specific rule prohibiting tank mixes – unless the pesticide label states such.”

Beekeepers want language added to labels that warns of possible effects to bees of tank mixing, as well as an effort to end daytime applications of the insecticides. But, despite the evidence of bee colony damage, beekeepers don’t have scientific data linking the colony damage to tank mixing.

The pesticides and fungicides used on almond farms affect colonies most by contaminating the brood. This happens when bees bring pollen laden with insecticides back into the hive, said Denise Qualls, a bee pollination broker based in Danville.

“I think this is happening to everybody, it’s just that some people are paying more attention to it than other people are,” Qualls said. “Some get the hives back and see 10 percent loss and they just move on, but for some of these beekeepers, a 10 percent loss can be 600 hives. That’s a lot,” she said.

This year, Qualls saw a 10 percent damage rate among the 9,000 colonies she brokered and placed on almond farms for pollinating.

The price tag for replacing that many bees: $180,000.

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The Sacramento Bee offers comments so readers may share information and opinions and engage in community discussion. We require thoughtful, articulate remarks that are relevant to the story and of interest to the community.

We will delete comments that are off-topic or that contain profanity, hate speech, personal attacks, name calling or inappropriate links. If a comment violates the guidelines, click the Flag icon to report it. Flagrant or repeat violators will be banned.

We thank you for respecting the community's complete guidelines.

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