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Re-evaluation Note

REV2010-01

# Uncoupling of Fertilizer-Pesticide Combination Products for Lawn and Turf Uses

*(publié aussi en français)*

**2 February 2010**

This document is published by the Health Canada Pest Management Regulatory Agency. For further information, please contact:

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HC Pub: 100037

ISBN: 978-1-100-14700-0 (978-1-100-14701-7)

Catalogue number: H113-5/2010-1E (H113-5/2010-1E-PDF)

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## 1.0 Purpose

This document is to communicate to stakeholders the decision to uncouple fertilizer-pesticide combination products intended for lawn and turf uses.

## 2.0 Scope

This regulatory action is focussed on the lawn and turf uses of fertilizer-pesticide combination products on the following types of turf:

- Lawn turf planted in or around residences, as well as public and commercial buildings including schools and cemeteries
- Sports and recreational turf such as turf in parks, playgrounds, golf courses, zoos, botanical gardens and athletic playing fields

These types of turf are collectively known as fine turf, which may be maintained by homeowners or by professional applicators.

This regulatory action does not include agricultural uses of fertilizer-pesticide combination products (turf farms), or products that have a single active material with both fertilizer and pesticidal properties.

## 3.0 Background

Health Canada's Pest Management Regulatory Agency (PMRA) regulates pesticides under the *Pest Control Products Act* including those intended for lawn and turf uses. All pesticide products that are registered for use and sale in Canada have undergone rigorous health and environmental risk assessments including the pesticides present in fertilizer-pesticide combinations.

Pesticides are often combined with fertilizers and sold as fertilizer-pesticide combination products, which are regulated by the Canadian Food Inspection Agency under the *Fertilizers Act*. When pesticides are combined with fertilizer such that the two components can only be applied at the same time and to the same area, the delivery mechanism for the pesticide component is brought into question. The very nature of combination products removes the flexibility of applying the pesticide as a spot application due to the need to accommodate the fertilizer, which is designed for broadcast application to the entire lawn surface at specified times of the year.

Pesticides should only be used when and where there is a need. Broadcast applications of pesticides over the whole area are warranted only for severe pest infestations that are widespread. As pest infestations are typically patchy, spot applications of pesticides to those areas are most often sufficient to ensure adequate control in turf.

To be effective, fertilizers and pesticides must each be applied at the appropriate timings, which typically do not coincide. Fertilizers are most often applied in spring or early summer, and/or in late summer or fall. A spring-applied lawn fertilizer results in increased tillering and rapid growth as temperatures increase, resulting in turf of increased density. A fall-applied lawn fertilizer also results in increased tillering and may result in increased winter hardiness.

The majority of pesticides found in pesticide-fertilizer combination products are broadleaf herbicides belonging to the synthetic auxin group of chemicals. This group of chemicals only controls broadleaf weeds that have emerged and are actively growing in the lawn. These herbicides are not preventative in that they will only control weeds that have emerged and they do not prevent weeds from becoming established in the lawn. Further, this group of chemicals is not long lasting in that they do not persist in the soil to prevent future weed infestations.

Combination products have been purchased for their convenience and ease of use as a two-in-one product to address separate lawn maintenance issues (for example, nutrient deficiency and various pest infestations) with a single application. However, these products are unsuitable as a delivery mechanism because they support broadcast application of the pesticide when this might not be warranted.

Ultimately, fertilizer and pesticide applications should be based on need. Fertilizer should only be used if the turf will benefit from additional nutrients, and pesticide should only be used as a broadcast treatment if the pest densities are sufficiently high across the area to be treated. Targeted, well-timed liquid formulations of pesticides minimize pesticide use on the lawn and turf sites.

#### **4.0 Regulatory decision**

Based on consultation with the provinces, experts and registrants, the PMRA has concluded that fertilizer-pesticide combination products for lawn and turf uses do not support the goals of best practices for pest management in turf. The PMRA, in conjunction with Canadian Food Inspection Agency, is taking action to uncouple the fertilizer-pesticide combination products intended for lawn and turf uses. A date of last sale of 31 December 2012 for fertilizer-pesticide combination products for lawn and turf uses has been set in order to allow for replacement products to be made available where needed.

Should situations arise to warrant the use of a fertilizer-pesticide combination product for lawn and turf uses, the PMRA will assess combination products in terms of the timing of application and flexibility to apply as a spot treatment, as well as potential risks to human health and the environment.

The PMRA decision to uncouple fertilizer-pesticide combination products is not based on the health or environmental risk assessments but rather the nature of combination products. Combination products remove the flexibility of applying spot applications of the pesticide due to the need to accommodate the fertilizer, which is designed for broadcast application to the entire lawn surface at specified times of the year.

Turf fertilizers will continue to be available for broadcast application when needed. Pesticide-only products will also continue to be available for lawn care use to homeowners and commercial applicators for either spot treatments of localized weed patches or for use as broadcast applications to severely infested turf areas when warranted. Although more time consuming, pest control in lawn and turf can be achieved with careful pesticide spot applications that target only the pests that are present and separate broadcast applications of fertilizers.

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**From:** Fish, Gary  
**Sent:** Wednesday, January 06, 2010 9:39 AM  
**To:** Fish, Gary  
**Subject:** Town of Harpswell Select Board Adopts Resolution for Lawn Care to Protect Water Quality  
**Follow Up Flag:** Follow up  
**Flag Status:** Red

Town of Harpswell Select Board Adopts Resolution for Lawn Care to Protect Water Quality on October 27, 2009 see web link for a copy of the resolution [RESOLUTION FOR LAWN CARE TO PROTECT WATER QUALITY](#)

An excerpt from the minutes of the meeting when the resolution was adopted is below.

The Town's Conservation Commission has many resources and links on their web page [http://www.harpswell.maine.gov/index.asp?Type=B\\_BASIC&SEC={FA81F206-533D-437E-A7BC-09C82D763D48}](http://www.harpswell.maine.gov/index.asp?Type=B_BASIC&SEC={FA81F206-533D-437E-A7BC-09C82D763D48})

10. Consider Conservation Commission Resolution for Green Practices: Mary Ann Nahf, chair of the Conservation Commission, introduced the Commission's goal of protecting water quality within the Town and Ann Nemrow and Donald Jones, of the Commission, read the proposed Resolution. The Commission wants to include residents in this program and asked them to take the pledge and stated the "how to" will be posted on the Town's website. Lawn professionals, clammers and lobstermen seem to support this program. Chairman Henderson stated the Commission has done so much and this program is very visible and shows the Commission's commitment. It was noted the Town is currently utilizing green practices. The Marine Resource Committee voted Tuesday night in favor of this Resolution. Chairman Henderson moved, seconded by Selectman Multer to adopt the Resolution; motion passed 3-0. Geoff Gillis, of Well Tree, commented on the Town's green practices and on its active enforcement of the shoreland zoning rules requiring vegetation.

\*\*\*\*\*

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*"I want to rename "green." I want to rename it geostrategic, geoeconomic, capitalistic and patriotic. I want to do that because I think that living, working, designing, manufacturing and projecting America in a green way can be the basis of a new unifying political movement for the 21st century." - Tom Friedman*

## RESOLUTION FOR LAWN CARE TO PROTECT WATER QUALITY

### **Rationale for the Town of Harpswell and its residents to use “green methods” on lawns to protect our water bodies**

WHEREAS we know that what happens on land sooner or later ends up in the water nearby, particularly as this applies to the use of pesticides and fertilizers (weed and feed) routinely spread on our lawns; and

WHEREAS Casco Bay, one of the richest and most diverse estuaries in the nation, has a watershed area that encompasses 41 towns and houses 25% of Maine’s population on only 3% of its land area; and

WHEREAS this density, taken in combination with a 700% increase in the usage of garden toxins over the last 12 years (Maine Board of Pesticide Control) has significantly raised pollution levels, and affected the water quality of Casco Bay as recorded by 20 years of water sampling by the Friends of Casco Bay; and

WHEREAS locally nitrogen, the worst polluter in salt water, affects the health of our clam and eelgrass beds, jeopardizing the breeding areas, and creating stress on the lobster, clam and bait fishing industries; and

WHEREAS, similarly, all freshwater bodies including ground and potable water supplies are equally at risk, and because one (1) pound of phosphorous entering an inland wetland, pond or stream produces 50 pounds of algae that absorb the oxygen and kill aquatic species; and

WHEREAS, the threat by synthetic chemicals sparked a bill, passed by the 2007 legislature, requiring the Maine Department of Environmental Protection to set standards on nitrogen discharges into the ocean; and

WHEREAS, some Maine coastal towns (Camden, Rockport, Castine, Brunswick, Kennebunkport), wishing to protect the health of their people, pets and wildlife without waiting for State controls, have opted to authorize the discontinuance of fertilizer and pesticide use applied to lawns for “cosmetic” purposes

WHEREAS there are now viable ecological, non-toxic lawn care alternatives, which assure a self-sustaining healthy environment,

WHEREAS *Best Management Practices (BMP)* such as *Bayscaping* on ocean frontages, and *Yardscaping* on fresh water frontages have proven both environmentally sound and more effective because these organic approaches enrich the soil with compost, which micro-organisms break down for the plants to absorb; and

WHEREAS such gardening and yard practices are a way of showing our neighbors we care for Harpswell and for the future of its limited supply of potable water; and

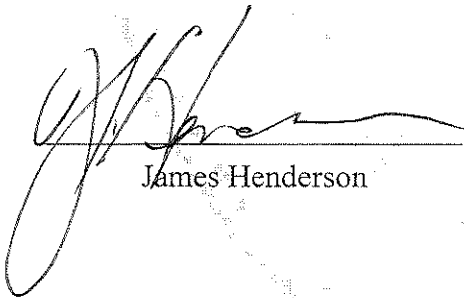
## RESOLUTION FOR LAWN CARE TO PROTECT WATER QUALITY

WHEREAS healthy garden and yard practices will alleviate the build-up of contaminants from such non-point sources as lawn runoff, difficult to detect and treat by other means, and insure a green yard that keeps Casco Bay blue; now, therefore,


BE IT RESOLVED that the Selectmen of the Town of Harpswell adopt a policy of exercising "green garden practices" on public lands, and encourage residents to follow suit, in such a manner that contributes to the health and safety of the environment, sustains a balance with nature, and incorporates the following principles:

- Replace water soluble 'weed and feed' chemicals that endanger our water with slow release, non-soluble organic nutrients that feed the soil and plants without runoff
- Favor native species for resilience against disease, climate and soil constraints
- Enrich biodiversity by avoiding monoculture and by promoting diversity of plant species
- Seek alternative design solutions for lawns when hostile factors of grade, shade and drainage exist: and

BE IT FURTHER RESOLVED that the Harpswell Conservation Commission provides information and suggestions to landowners in order to affect this Resolution and these principles



James Henderson



Mark Wallace



Elinor Multer

Available educational materials at <http://www.harpswell.maine.gov/> :  
*Six Point Best Garden Program for a Healthy, Self-Sustaining Lawn*  
*Six Point Best Garden Program - Seasonal Schedule*  
*Turf Pests and Diseases, and How to Treat Them*



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### Aerial Spraying Bill Pits Farmer Against Farmer

01/22/2010 Reported By: [A.J. Higgins](#)

Supporters and opponents of a quarter-mile buffer for agricultural spray zones packed a meeting of the Legislature's Agriculture, Conservation and Forestry Committee today to speak on a bill that would impose new burdens on landowners. Health care experts and organic farmers say the bill is needed to protect the public, but commercial potato, blueberry and broccoll farmers say there are already adequate safeguards under an existing law that passed by the Legislature a year ago.

<b>Related Media</b>	
<b>Aerial Spraying Bill Pits Farmer Against Farmer</b>	Listen Duration: 3:43

Tension was already mounting inside the jammed legislative hearing room where committee members were preparing for a full day of testimony on proposed restrictions to aerial pesticide spraying. Committee co-chairman John Nutting warned the crowd to be respectful.

Then Dr. Paul Leibow, of Physicians for Social Responsibility, offered his remedy for abutters of cropland designated for aerial apraying. "A great solution would be to add the mandatory use of siren devices, like they use before explosions," Leibow said, setting off a round of laughter. "I'm running the hearing here," Nutting said, banging his gavel. "Either we're going to have respect for people who are testifying, or we'll let one person at a time in this room. Now, I know there's a dfference of opinion here, we're going to hear from everyone."

Despite farmers' and pilots' reaction, Leibow continued. "I think the sirens are an incredible idea. I don't think it's a ridiculous idea, and I think it might be the most cost-effective idea of any ideas."

"Just the image of that goes back to old World War II photographs of the bombers coming from Germany, for Pete's sake," said state Sen. Roger Sherman. The war-time image characterized Sherman, a Houlton Republican, may not be so far-fetched. For those on either side of the issue, aerial spraying is turning into a protracted conflict with a legislative history that's already four years old.

Sherman and other committee members thought they had resolved the issue for the Maine Board of Pesticides Control only a year ago. But organic farmers and others concerned over the potential dangers of areial pesticide spraying aren't going away. "Well, you had those groups that represent a certain group of people in this state that will not give up on these things," Sherman says.

Last year, the Legislature created a registry for landowners with properties that abut potential spray areas. The landowners could enroll in the registry and be placed on a list of people to be notified in the event that an aerial spraying was planned.

But Heather Spaulding of the Maine Organic Farmers and Gardeners Association says that makes sense for those closest to spray areas. She wants to require landowners to announce their spraying plans for the year by March 15th. And she wants them to alert abutters within a quarter-mile of the spray area.

"In Maine, an abutting property could be an entire township, or a very large tract of land," she says. "And so one of the things we tried to do is say, 'OK, let's make it so that it's abutting property owners also who are within a quarter mile. So both factors have to be true."

"If you do not kill this bill and rescind the law on the books, you'll force me to close my business, sell my home, move my family to a state that is more agricultural-friendly," said Matthew Carmichael, who says he is the last fixed-wing aerial sprayer in Aroostook County.

Carmichael's threat to pull out of the region under the threat of excessive fines is being taken seriously by Emily Smith, who grows broccoli on a vast expanse of cropland in northern Maine. She says the notification requirements in the spray bill are unrealistic.

"We don't always have every field that we want to plant on our 4,000 acres of broccoli determined by

1/25/2010

## Aerial Spraying Bill Pits Farmer Against...

March 15th," she said. "So if that were the case, we would need to notify every resident of Presque Isle, Westfield, Mars Hill, Easton, Washburn, Mapleton, Fort Fairfield, Caribou, Limestone and Caswell -- approximately 40,000 individuals. Stamps are 44-cents. I don't need a calculator to tell you that's a lot of money."

Committee co-chair Sen. John Nutting says he expects his panel to devote the next several meetings to the aerial spraying legislation.

 [Return](#)

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## No dead bug, no exterminator, in public housing

The logo for Associated Press, consisting of the letters "AP" in a bold, red, sans-serif font, followed by the words "Associated Press" in a smaller, black, sans-serif font.

December 15, 2009

LEWISTON, Maine --When it comes to bed bug complaints, the public housing authority in Maine's second-largest city says show me the bug.

Misti Oliveira, a public housing tenant in Lewiston, says she couldn't believe she was required to deliver a dead bug to the Lewiston Housing Authority. She thought the bites suffered by her two children ages 1 1/2 years old and 2 1/2 years old were sufficient evidence.

Authority Executive Director Jim Dowling confirmed to the Sun Journal newspaper that the current policy is no bug, no exterminator. Eventually, an exterminator was dispatched to Oliveira's unit.

Bed bugs are a growing problem. But Kristine Foye of the U.S. Department of Housing and Urban Development says the department does not have a specific policy regarding bed bugs.

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Information from: Sun-Journal, <http://www.sunjournal.com> ■

CITY

## Bed bugs policy questioned by tenant

Rebekah Metzler, Staff Writer

Dec 15, 2009 12:00 am



Misti Oliveira kept a small number of the cockroaches she killed in her Hillview apartment to show to the management. It took them eight months, according to Oliveira, to schedule an exterminator for her otherwise spotless home. (Amber Waterman/Sun Journal)

LEWISTON — They needed to see a body, dead or alive.

That's what Misti Oliveira, a tenant at the Hillview Housing Project in Lewiston, was told when she complained to the Lewiston Housing Authority management office about the bed bugs she had in her apartment.

Oliveira is a full-time student at Central Maine Community College, who works part time, and is a single mother raising two children ages 1½ years old and 2½ years old. She said she has been trying to get the housing authority, which receives federal funding, to send an exterminator to come deal with the problem for the past two months.

"I was told there is nothing they can do until I physically catch one," she said. "I can't catch one. I've been looking and trying to catch one because I want these gone; it even says online that these suckers are so hard to catch sometimes you need a professional just to even catch one."

Her 1½-year-old son now has a serious infection from picking a scab left from a bed bug bite, she said, adding that she has medical records and a note from a doctor confirming it. But even that wasn't enough evidence for the building authorities, she said.

It wasn't until a building maintenance worker, who was in her apartment about a week and a half ago for a different reason, saw evidence of the bugs, that the Lewiston Housing Authority scheduled an extermination appointment for her apartment.

"You shouldn't have to wait until you physically catch one, which could take months and months," she said. "No, you don't come spray right away, I understand it costs money and time. But if you can prove the bites, coming over and showing them the bites, if you have a doctor's note, then something should be done."

Jim Dowling, executive director of the Lewiston Housing Authority, confirmed that the working policy for bed bug treatment is to ask the tenant to show a bed bug body first.

"If someone reports bed bugs, but doesn't catch one or have anything to show us, it's very hard to know whether there are bed bugs there or not," he said. "It saves (us) from tearing a unit apart looking for bed bugs, which can sometimes be hard to spot."

Dowling said the housing authority's written policy does not specifically mention bed bugs.

"The Lewiston Housing Authority will make all efforts to provide a healthy and pest-free environment for its resident," he read from the policy.

Bed bugs have become an increasing problem over the last two or three years, Dowling said, not just in Lewiston but all over the United States.

"Bed bugs have become an enormous problem and we exterminate them every time we find them, but they do keep coming," he said.

Past cases have been addressed after tenants have produced a bed bug body, he said.

"That's what we look for, those can be found," he said. "(Oliveira) did not bring a body to the office. She actually had reported bed bugs two or three times and we had asked her each time, 'can you catch one and we will come and confirm?' But to my knowledge, that never happened, she never caught one."

Dowling said there are currently three bed bug cases that are scheduled for treatment among the 459 units that are owned or managed by the Lewiston Housing Authority. About 20 units are getting treated for cockroaches, he said.

Oliveira, who's rent is paid through February when her lease runs out, said if she continues to have trouble with bed bugs she's prepared to move out; an exterminator has been scheduled to come treat her apartment on Wednesday.

"I'm not going to sit around for a year while they try and get rid of the bed bugs," she said.

Kristine Foye, deputy regional director of the Boston regional office of the U.S. Department of Housing and Urban Development, said the department does not have a specific policy regarding bed bugs.

"Housing authorities are expected to maintain decent, safe and sanitary housing, but it really is up to the property manager to address the issues," she said.

For more information about bed bugs, visit <http://tiny.cc/6TWmD>.

[rmetzler@sunjournal.com](mailto:rmetzler@sunjournal.com)



Full-time college student and working mom Misti Oliveira says she is going to throw out all of her mattresses, and possibly some other furniture, when she moves out of her Hillview apartment because of the bed bugs and cockroaches in her apartment. Her 1½-year-old son now has a serious skin infection from scratching at bed bug bites. (Amber Waterman/Sun Journal)



## Supreme Court won't review pesticide case

(2/22/2010)

**Jacqui Fatka**

The *National Cotton Council vs. EPA* case out of the U.S. Sixth Circuit of Appeals centers on whether or not federally licensed pesticide applications need a Clean Water Act permit if sprayed on, over or near water.

Ag groups have asked for a Supreme Court hearing on the case, but today found out that the highest court would not review the case.

The George W. Bush Administration put a regulatory patch in place to address the issue. Modern agriculture was upset because it came up short of defining where National Pollutant Discharge Elimination System (NPDES) permits should and shouldn't be required. Don Parrish, senior directory of regulatory relations at the American Farm Bureau Federation, said a broad interpretation of the ruling could require as many as 5 million new pesticide applications.

In a statement from AFBF President Bob Stallman, he said the Supreme Court's decision not to revisit the case compounds the mistake made by the U.S. Circuit Court of Appeals. "All farmers know they must use chemicals properly. They also know the label on each chemical they use is the law of the land. Going through redundant bureaucratic red tape for a duplicate permit to apply a safe product is preposterous. That kind of regulatory overkill will not improve food safety or the environment," Stallman said.

CropLife America (CLA) had filed a cert petition asking the Supreme Court to review and reconsider the three-judge panel's decision which struck down the EPA's regulation that NPDES permits are not required when applying pesticides to or near water sources. Historically, agricultural pest management activities have been treated as non-point sources under the Clean Water Act and have not required NPDES permits.

"The panel's ruling creates another legal burden for our farmers, custom applicators and agricultural dealers, and leads to additional regulations which may well further prevent food growers from maximizing their output," said Jay Vroom, president and CEO of CLA. "We are disappointed that the 6th Circuit's decision could cause the U.S. government to continue to practice a precautionary policy which is detrimental not only for farmers, but could prevent the country from producing more food, fuel and fiber for a growing world population."

The final decision by the 6th Circuit is stayed until April 2011. Despite the Supreme Court's decision, CLA said it will continue to pursue additional avenues to contain the 6th Circuit's ruling. The organization will also continue to work with key stakeholders to ensure that the critical needs of agriculture are best preserved.

"While we recognize that only a very small percentage of cert petitions are accepted for review," said Douglas Nelson, executive vice president and general counsel of CLA, "we are also aware of decisions of other federal courts in NPDES cases which affirm the regulatory framework of EPA and Congress to treat pesticides as non-point source applications. Regardless, CLA will continue to work with EPA to minimize the burden placed on farmers and reduce the disruption this will cause across the crop protection industry."

CLA filed the cert petition with the U.S. Supreme Court on November 2, 2009, with support from a host of agricultural allies including: Agribusiness Association of Iowa, BASF Corporation, FMC Corporation, Responsible Industry for a Sound Environment, Southern Crop Production Association and Syngenta Crop Protection, Inc. A separate cert petition challenging the 6th Circuit's decision was also filed by the American Farm Bureau Federation, American Forest & Paper Association and The National Cotton Council.

Several amici briefs supporting CLA's cert petition were also filed by various state departments of agriculture and national trade associations. Additionally, over 30 members of Congress, including both Democrats and Republicans, also filed a brief requesting the Supreme Court accept the case.

## Schlein, Paul B

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**From:** Fish, Gary  
**Sent:** Thursday, February 25, 2010 10:18 AM  
**To:** Stratton, Robert D; Jennings, Henry; Connors, Raymond G; Schlein, Paul B; Hicks, Lebelles; Tomlinson, Mary E; Miller, Max; Meserve, Eugene P; Shaw, Arthur; Haley, John; Barrett, Brian C  
**Subject:** Supreme Court Rejects Request to Overturn 6th Circuit Court Ruling on Pesticides, the CWA, and the need for NPDES Permits  
**Follow Up Flag:** Follow up  
**Flag Status:** Green  
**Attachments:** Supremes-Reject-NPDES-Hearing.pdf

[FYI See below](#)

As it stands now, the above and attached Supreme Court ruling keeps the issue of needing NPDES Permits on track for implementation by April 9, 2011.

Now the burden of implementation falls squarely back on the EPA and state regulatory agencies to develop and issue the appropriate permitting to be in compliance with the Clean Water Act.

Only an act of law, by the congress and the president, can change this.

Regards,

Andrew

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"...with firmness in the right, as God gives us to see the right, let us strive on to finish the work we are in..."  
Quotation from Abraham Lincoln

## Monsanto towers above seed rivals

BY CHRISTOPHER LEONARD

12/14/2009

ST. LOUIS -- Confidential contracts detailing Monsanto Co.'s business practices reveal how the world's biggest seed developer is squeezing competitors, controlling smaller seed companies and protecting its dominance over the multibillion-dollar market for genetically altered crops, an Associated Press investigation has found.

With Monsanto's patented genes being inserted into roughly 95 percent of all soybeans and 80 percent of all corn grown in the U.S., the company also is using its wide reach to control the ability of new biotech firms to get wide distribution for their products, according to a review of several Monsanto licensing agreements and dozens of interviews with seed industry participants, agriculture and legal experts.

Declining competition in the seed business could lead to price hikes that ripple out to every family's dinner table. That's because the corn flakes you had for breakfast, soda you drank at lunch and beef stew you ate for dinner likely were produced from crops grown with Monsanto's patented genes.

Monsanto's methods are spelled out in a series of confidential commercial licensing agreements obtained by the AP. The contracts, as long as 30 pages, include basic terms for the selling of engineered crops resistant to Monsanto's Roundup herbicide, along with shorter supplementary agreements that address new Monsanto traits or other contract amendments.

The company has used the agreements to spread its technology -- giving some 200 smaller companies the right to insert Monsanto's genes in their separate strains of corn and soybean plants. But, the AP found, access to Monsanto's genes comes at a cost, and with plenty of strings attached.

For example, one contract provision bans independent companies from breeding plants that contain both Monsanto's genes and the genes of any of its competitors, unless Monsanto gives prior written permission -- giving Monsanto the ability to effectively lock out competitors from inserting their patented traits into the vast share of U.S. crops that already contain Monsanto's genes.

Monsanto's business strategies and licensing agreements are being investigated by the U.S. Department of Justice and at least two state attorneys general, who are trying to determine if the practices violate U.S. antitrust laws. The practices also are at the heart of civil antitrust suits filed against Monsanto by its competitors, including a 2004 suit filed by Syngenta AG that was settled with an agreement and ongoing litigation filed this summer by DuPont in response to a Monsanto lawsuit.

The suburban St. Louis-based agricultural giant said it's done nothing wrong.

"We do not believe there is any merit to allegations about our licensing agreement or the terms within," said Monsanto spokesman Lee Quarles. He said he couldn't comment on many specific provisions of the agreements because they are confidential and the subject of ongoing litigation.

"Our approach to licensing (with) many companies is pro-competitive and has enabled literally hundreds of seed companies, including all of our major direct competitors, to offer thousands of new seed products to farmers," he said.

The benefit of Monsanto's technology for farmers has been undeniable, but some of its major competitors and smaller seed firms claim the company is using strong-arm tactics to further its control.

"We now believe that Monsanto has control over as much as 90 percent of (seed genetics). This level of control is almost unbelievable," said Neil Harl, agricultural economist at Iowa State University who has studied the seed industry for decades. "The upshot of that is that it's tightening Monsanto's control, and makes it possible for them to increase their prices long term. And we've seen this happening the last five years, and the end is not in sight."

At issue is how much power one company can have over seeds, the foundation of the world's food supply. Without stiff competition, Monsanto could raise its seed prices at will, which in turn could raise the cost of everything from animal feed to wheat bread and cookies.

The price of seeds is already rising. Monsanto increased some corn seed prices last year by 25 percent, with an additional 7 percent hike planned for corn seeds in 2010. Monsanto brand soybean seeds climbed 28 percent last year and will be flat or up 6 percent in 2010, said company spokeswoman Kelli Powers.

Monsanto's broad use of licensing agreements has made its biotech traits among the most widely and rapidly adopted technologies in farming history. These days, when farmers buy bags of seed with obscure brand names like AgVenture or M-Pride Genetics, they are paying for Monsanto's licensed products.

One of the numerous provisions in the licensing agreements is a ban on mixing genes -- or "stacking" in industry lingo -- that enhance Monsanto's power.

One contract provision likely helped Monsanto buy 24 independent seed companies throughout the Farm Belt over the last few years: that corn seed agreement says that if a smaller company changes ownership, its inventory with Monsanto's traits "shall be destroyed immediately."

Another provision from contracts earlier this decade -- regarding rebates -- also help explain Monsanto's rapid growth as it rolled out new products.

One contract gave an independent seed company deep discounts if the company ensured that Monsanto's products would make up 70 percent of its total corn seed inventory. In its 2004 lawsuit, Syngenta called the discounts part of Monsanto's "scorched earth campaign" to keep Syngenta's new traits out of the market.

Quarles said the discounts were used to entice seed companies to carry Monsanto products when the technology was new and farmers hadn't yet used it. Now that the products are widespread, Monsanto has discontinued the discounts, he said.

The Monsanto contracts reviewed by the AP prohibit seed companies from discussing terms, and Monsanto has the right to cancel deals and wipe out the inventory of a business if the confidentiality clauses are violated.

Thomas Terral, chief executive officer of Terral Seed in Louisiana, said he recently rejected a Monsanto contract because it put too many restrictions on his business. But Terral refused to provide the unsigned contract to AP or even discuss its contents because he was afraid Monsanto would retaliate and cancel the rest of his agreements.

"I would be so tied up in what I was able to do that basically I would have no value to anybody else," he said. "The only person I would have value to is Monsanto, and I would continue to pay them millions in fees."

Independent seed company owners could drop their contracts with Monsanto and return to selling conventional seed, but they say it could be financially ruinous. Monsanto's Roundup Ready gene has become the industry standard over the last decade, and small companies fear losing customers if they drop it. It also can take years of breeding and investment to mix Monsanto's genes into a seed company's product line, so dropping the genes can be costly.

Monsanto acknowledged that U.S. Department of Justice lawyers are seeking documents and interviewing company employees about its marketing practices. The DOJ wouldn't comment.

A spokesman for Iowa Attorney General Tom Miller said the office is examining possible antitrust violations. Additionally, two sources familiar with an investigation in Texas said state Attorney General Greg Abbott's office is considering the same issues. States have the authority to enforce federal antitrust law, and attorneys general are often involved in such cases.

Monsanto chairman and chief executive officer Hugh Grant told investment analysts during a conference call this fall that the price increases are justified by the productivity boost farmers get from the company's seeds. Farmers and seed company owners agree that Monsanto's technology has boosted yields and profits, saving farmers time they once spent weeding and money they once spent on pesticides.

But recent price hikes have still been tough to swallow on the farm.

"It's just like I got hit with bad weather and got a poor yield. It just means I've got less in the bottom line," said Markus Reinke, a corn and soybean farmer near Concordia, Mo. who took over his family's farm in 1965. "They can charge because they can do it, and get away with it. And us farmers just complain, and shake our heads and go along with it."

Any Justice Department case against Monsanto could break new ground in balancing a company's right to control its patented products while protecting competitors' right to free and open competition, said Kevin Arquit, former director of the Federal Trade Commission competition bureau and now an antitrust attorney with Simpson Thacher & Bartlett LLP in New York.

"These are very interesting issues, and not just for the companies, but for the Justice Department," Arquit said. "They're in an area where there is uncertainty in the law and there are consumer welfare implications and government policy implications for whatever the result is."

Other seed companies have followed Monsanto's lead by including restrictive clauses in their licensing agreements, but their products only penetrate smaller segments of the U.S. seed market. Monsanto's Roundup Ready gene, on the other hand, is in such a wide array of crops that its licensing agreements can have a massive effect on the rules of the marketplace.

Monsanto was only a niche player in the seed business just 12 years ago. It rose to the top thanks to innovation by its scientists and aggressive use of patent law by its attorneys.

First came the science, when Monsanto in 1996 introduced the world's first commercial strain of genetically engineered soybeans. The Roundup Ready plants were resistant to the herbicide, allowing farmers to spray Roundup whenever they wanted rather than wait until the soybeans had grown enough to withstand the chemical.

The company soon released other genetically altered crops, such as corn plants that produced a natural pesticide to ward off bugs. While Monsanto had blockbuster products, it didn't yet have a big foothold in a seed industry made up of hundreds of companies that supplied farmers.

That's where the legal innovations came in, as Monsanto became among the first to widely patent its genes and gain the right to strictly control how they were used. That control let it spread its technology through licensing agreements, while shaping the marketplace around them.

Back in the 1970s, public universities developed new traits for corn and soybean seeds that made them grow hardy and resist pests. Small seed companies got the traits cheaply and could blend them to breed superior crops without restriction. But the agreements give Monsanto control over mixing multiple biotech traits into crops.

The restrictions even apply to taxpayer-funded researchers.

Roger Boerma, a research professor at the University of Georgia, is developing specialized strains of soybeans that grow well in southeastern states, but his current research is tangled up in such restrictions from Monsanto and its competitors.

"It's made one level of our life incredibly challenging and difficult," Boerma said.

The rules also can restrict research. Boerma halted research on a line of new soybean plants that contain a trait from a Monsanto competitor when he learned that the trait was ineffective unless it could be mixed with Monsanto's Roundup Ready gene.

Boerma said he hasn't considered asking Monsanto's permission to mix its traits with the competitor's trait.

"I think the co-mingling of their trait technology with another company's trait technology would likely be a serious problem for them," he said.

Quarles pointed out that Monsanto has signed agreements with several companies allowing them to stack their traits with Monsanto's. After Syngenta settled its lawsuit, for example, the companies struck a broad cross-licensing accord.

At the same time, Monsanto's patent rights give it the authority to say how independent companies use its traits, Quarles said.

"Please also keep in mind that, as the (intellectual property developer), it is our right to determine who will obtain rights to our technology and for what purpose," he said.

Monsanto's provision requiring companies to destroy seeds containing Monsanto's traits if a competitor buys them prohibited DuPont or other big firms from bidding against Monsanto when it snapped up two dozen smaller seed companies over the last five years, said David Boies, a lawyer representing DuPont who previously was a prosecutor on the federal antitrust case against Microsoft Corp.

Competitive bids from companies like DuPont could have made it far more expensive for Monsanto to bring the smaller companies into its fold. But that contract provision prevented bidding wars, according to DuPont.

"If the independent seed company is losing their license and has to destroy their seeds, they're not going to have anything, in effect, to sell," Boies said. "It requires them to destroy things -- destroy things they paid for -- if they go competitive. That's exactly the kind of restriction on competitive choice that the antitrust laws outlaw."

Quarles said some of the Monsanto contracts let companies sell their inventory for a period of time, rather than be required to destroy it. Seed companies also don't have to pay royalty fees on the bags of seed they destroyed.

"Simply put, it was designed to facilitate early adoption of the technology," he said.

Some independent seed company owners say they feel increasingly pinched as Monsanto cements its leadership in the industry.

"They have the capital, they have the resources, they own lots of companies, and buying more. We're small town, they're Wall Street," said Bill Cook, co-owner of M-Pride Genetics seed company in Garden City, Mo., who also declined to discuss or provide the agreements. "It's very difficult to compete in this environment against companies like Monsanto."

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## Investigators: Pesticide likely responsible for 4-year-old's death

February 7, 2010



LAYTON -- Authorities say a pesticide is most likely responsible for the death of a 4-year-old Layton girl.

Hazmat crews spent all day Sunday testing the girl's home near 1500 North and 2400 West. The home has been sealed off to anyone not wearing protective gear.

Layton's fire chief said crews found traces of phosphine gas coming from a rodent fumigant that was placed just outside the home. The gas was seeping into the house.

Police said the Toone family called 911 when their carbon monoxide alarm went off Friday afternoon. Fire crews came to the home to investigate but could only detect low levels of the gas in the basement. They ventilated the house, notified Questar and allowed the family to go back inside.

Police said the family told firefighters they had recently had an exterminator come to the home to deal with a mouse problem. The exterminator apparently put poisonous pellets in the ground outside the home.

Then on Saturday, neighbors said the entire family fell ill.

"I just know the family got sick, but they all thought it was food poisoning. They said they had been puking and it was not just one, it was all of them," said neighbor Jerry Lynn Smith.

Saturday night, family members found 4-year-old Rebecca Toone unconscious and not breathing. They took her to a local pediatric clinic, but she was soon transported to the Davis County Hospital, where she died around midnight.

"She was the cutest little button, just was always running around and chasing her sisters. They are a great family," said Smith. "When I got the phone call that she had passed away, I just grabbed my kids and hugged them, just to let them know that I still loved them. She's going to be missed."

Early autopsy results came back and ruled out CO poisoning as the cause of death.

Officials from the Layton City Police Department, Layton City Fire Department, Davis County Health Department and the Utah National Guard Hazmat team were called out to the home Sunday to test for poisonous chemicals.

The National Guard used high-tech equipment to make sure the home was safe enough to enter.

Investigators don't know for sure what killed Rebecca, but they have a strong idea.

"Something in that pesticide most likely, but until they get the results out here to us we won't really know," said Layton City Fire Battalion Chief Lonnie Adams.

The National Guard will return to the home Monday with a more accurate tool that should be able to determine whether or not it's phosphine gas inside the home. Until then, no one will be allowed inside.



Hazmat teams investigate the Layton home where authorities believe a 4-year-old girl was exposed to something that may have caused her death.

Police say neighbors are completely safe.

*E-mail: [ngonzales@ksl.com](mailto:ngonzales@ksl.com)*

## Second Layton girl dies in case of possible pesticide poisoning

Layton family: 'We are heartbroken'

By Erin Alberty And Jason Bergreen  
The Salt Lake Tribune

Salt Lake Tribune

Updated:

# The Salt Lake Tribune

<http://www.sltrib.com>

A Layton family has lost its second daughter since toxic pesticide fumes apparently wafted into their home last weekend.

Rachel Toone, 15 months, died Tuesday at Primary Children's Medical Center. Three days earlier her 4-year-old sister, Rebecca, died at Davis Hospital after she had begun struggling to breathe in the family's home.

"We are heartbroken," the Toone family wrote in a press statement announcing Rachel's death. Rachel's health deteriorated after heart failure early Monday, the family wrote.

Authorities suspect the toxic gas phosphine sickened the family. Investigators say the gas may have entered into the family's home after an exterminator dropped Fumitoxin aluminum phosphide pellets in burrow holes in the lawn Friday to kill small rodents known as voles.

Rebecca Toone died Saturday after she grew sick in the family's home. Her parents and siblings also were hospitalized with flu-like symptoms the same day. They were all discharged Sunday, but Rachel fell ill again later that day.

Bugman Pest placed about 1½ pounds of Fumitoxin aluminum phosphide pellets alongside a sidewalk leading to the Toone's front porch, coming within about 7 feet of the front door and 3 feet of the garage, according to a hazardous materials cleanup team from the Utah National Guard.

The pellets are not to be used within 15 feet of any building occupied by people or animals, especially homes, according to a Fumitoxin use manual on the Web site of its manufacturer, Pestcon Systems, Inc.

Phone messages left with Bugman Pest and Lawn on Tuesday were not returned, and owner Ray Wilson declined to speak to a reporter at his home.

Investigators said the phosphine gas collected in an open space under the stairs to the porch and seeped into the house. Crews found elevated levels of phosphine in the entryway, the garage and in what appeared to be a child's bedroom.

On Tuesday, Davis County officials determined the Toone family home is now free of phosphine. A final sweep of the house registered zero readings for phosphine gas, said Fire Chief Kevin Ward.

Davis County Health Department spokesman Bob Ballew said the Toone family was welcome to return home when they are ready.

"We're confident that the risk from the chemical has been cleared," he said.

Layton police Lt. Quinn Moyes said Tuesday that investigators are still working with other agencies to determine what, if any, mistakes could have led to the death of Rebecca and Rachel.

"There are interviews to conduct and we're not ready to screen any possible charges right now," Moyes said. "There may be criminal charges, there may not. It's just too early to tell."

However, according to a report aired by ABC 4 News Tuesday night, Bugman Pest and Lawn has run into problems regarding its use of Fumitoxin before. Reportedly, Utah Department of Agriculture and Food

documents reveal that the first time the company was cited, it was for clerical errors in their record keeping; the second, for the mishandling of certain chemicals.

ABC 4 reports that in the latter case, while the technician was certified, he wasn't certified in the chemicals application process itself.

*Editor's note: A previous version of this story quoted a Sandy woman who thought the death of her dogs was related to the use of Fumitoxin. She has now retracted that statement after confirming the dogs died a week before the application of the pesticide.*

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February 18, 2010

## Lobster death raises questions

By CBC News  
CBC News

*New Brunswick's aquaculture industry is facing questions after an illegal pesticide was found on weak and dying lobsters on the Fundy Coast last November.*

New Brunswick's aquaculture industry is facing questions after an illegal pesticide was found on weak and dying lobsters on the Fundy coast last November.

Environment Canada officials are still investigating how the pesticide, Cypermethrin, made its way onto the lobsters in the Grand Manan and Seal Cove areas.

Cypermethrin is illegal to use in Canadian waters and is toxic to lobsters. But it has been used to kill sea lice in European fish farms.

And that's creating concern about its use in the Bay of Fundy considering some of the dead lobsters were found not far from aquaculture sites last fall.

David Thompson, an environmentalist, said many people in the area have suspicions about how it got in the water.

"Public feeling is that it probably originated at salmon farm sites, with people attempting to control a very serious problem they had with sea lice," Thompson said.

**'We want the public to know that salmon farmers are extremely diligent at protecting marine environment. This is where we grow our fish too.'**- Pamela Parker, N.B. Salmon Growers Association

That allegation was strongly rebuffed by the group representing New Brunswick's aquaculture industry.

Pamela Parker, the executive director of the New Brunswick Salmon Growers Association, said the organization does not think any of its members were responsible for Cypermethrin getting into the Bay of Fundy.

And Parker said the group does not condone the use of any illegal pesticide.

"We want the public to know that salmon farmers are extremely diligent at protecting marine environment. This is where we grow our fish too," Parker said.

"We only use products authorized by Environment Canada, and we only use them [in] accordance to prescribed method of treatment. Vets are the only ones who can prescribe these treatments and the fish are under a vet's care, so we take this very, very seriously. "

Dead lobsters first appeared last November in Grand Manan's Seal Cove, and five days later a fisherman 50 kilometres away in Pocologan found more dead lobsters in his traps.

Soon after that discovery, another 816 kilograms of weak or dead lobster were discovered in Deer Island's Fairhaven Harbour.

Tests found that the lobsters were exposed to Cypermethrin, a pesticide that's illegal to use in marine environments and toxic to lobsters. Environment Canada officials said on Tuesday that human health was never in danger.

Pesticide found in 1996

Environment Canada has launched two investigations into the lobster kills on Grand Manan and Deer Island. The federal department cannot say how long the investigations will take to wrap up.

The fall lobster season in the Bay of Fundy starts in mid-November and stretches into January.

This isn't the first time that the pesticide has been found in the Bay of Fundy.

In 1996, about 50,000 lobsters were found dead in a pound near St. George.

Tests revealed they were exposed to Cypermethrin.

Many people at the time blamed the aquaculture industries in the area for the pesticide getting into the water.

Canadian Broadcasting Corporation



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REPORT

## Behind Mass Die-Offs, Pesticides Lurk as Culprit

*In the past dozen years, three new diseases have decimated populations of amphibians, honeybees, and — most recently — bats. Increasingly, scientists suspect that low-level exposure to pesticides could be contributing to this rash of epidemics.*

**BY SONIA SHAH**

Ever since Olga Owen Huckins shared the spectacle of a yard full of dead, DDT-poisoned birds with her friend Rachel Carson in 1958, scientists have been tracking the dramatic toll on wildlife of a planet awash in pesticides. Today, drips and puffs of pesticides surround us everywhere, contaminating 90 percent of the nation's major rivers and streams, more than 80 percent of sampled fish, and one-third of the nation's aquifers. According to the U.S. Fish and Wildlife Service, fish and birds that unsuspectingly expose themselves to this chemical soup die by the millions every year.

But as regulators grapple with the lethal dangers of pesticides, scientists are discovering that even seemingly benign, low-level exposures to pesticides can affect wild creatures in subtle, unexpected ways — and could even be contributing to a rash of new epidemics pushing species to the brink of extinction.

In the past dozen years, no fewer than three never-before-seen diseases have decimated populations of amphibians, bees, and — most recently — bats. A growing body of evidence indicates that pesticide exposure may be playing an important role in the decline of the first two species, and scientists are investigating whether such exposures may be involved in the deaths of more than 1 million bats in the northeastern United States over the past several years.

For decades, toxicologists have accrued a range of evidence showing that low-level pesticide exposure impairs immune function in wildlife, and have correlated this immune damage to outbreaks of disease. Consumption of pesticide-contaminated herring has been found to impair the immune function of captive seals, for example, and may have contributed to an outbreak of distemper that killed over 18,000 harbor seals along the northern European coast in 1988. Exposure to PCBs has been correlated with higher levels of roundworm infection in Arctic seagulls. The popular herbicide atrazine has been shown to make tadpoles more susceptible to parasitic worms.



Wikimedia  
White-nose Syndrome, named for the tell-tale white fuzz it leaves on bats' ears and noses, has killed more than a million bats in the northeastern United States.

The recent spate of widespread die-offs began in amphibians. Scientists discovered the culprit — an aquatic fungus called *Batrachochytrium dendrobatidis*, of a class of fungi called “chytrids” — in 1998. Its devastation, says amphibian expert Kevin Zippel, is “unlike anything we’ve seen since the extinction of the dinosaurs.” Over 1,800 species of amphibians currently face extinction.

It may be, as many experts believe, that the chytrid fungus is a novel pathogen, decimating species that have no armor against it, much as Europe’s smallpox and measles decimated Native Americans in the sixteenth and seventeenth centuries. But “there is a really good plausible story of chemicals affecting the immune system and making animals more susceptible,” as well, says San Francisco State University conservation biologist Carlos Davidson.

In California, for example, insecticides coated on the crops of the San Joaquin Valley are known to waft upwind to the Sierra Nevada mountains, where they settle in the air,

### **There is a strong correlation between upwind pesticide use and declining amphibian populations.**

snow, and surface waters, and inside the tissues of amphibians. And when Davidson compared historical reports of pesticide use, habitat loss, wind patterns, and amphibian population counts in California for the years

1971 to 1991, he found a strong correlation between upwind pesticide use — in particular cholinesterase-inhibiting chemicals such as the insecticide carbaryl — and declining amphibian populations.

Experimental evidence bolsters Davidson’s findings. In lab experiments, exposure to carbaryl dramatically reduced yellow-legged frogs’ production of fungus-fighting compounds called antimicrobial peptides, which may be crucial to amphibians’ ability to fend off chytrid fungus. Further testing has shown that amphibian species that produce the most effective mixes of antimicrobial peptides resist experimental chytrid infection, and tend to be those that survive most successfully in the wild.

Six years after scientists discovered the fungal assault on amphibians, a mysterious plague began decimating honeybees. Foraging honeybees first started vanishing from their hives, abandoning their broods and queens to certain death by starvation, in 2004. Alarmed beekeepers dubbed the devastating malady “colony collapse disorder.” Between 2006 and 2009, colony collapse disorder and other ills destroyed 35 percent of the U.S. honeybee population.

Some experts believe colony collapse disorder is the result of a “perfect storm” of honeybee-debilitating factors: poor nutrition, immune dysfunction from decades of industrial beekeeping practices, and the



Some scientists believe a new class of chemicals based on nicotine may be to blame for “colony collapse disorder” that destroyed nearly 35 percent of the U.S. honeybee population between 2006 and 2009.

opportunism of multiple pathogens, acting in malevolent concert. But many beekeepers believe that a new class of chemicals based on nicotine, called neonicotinoids, may be to blame.

Neonicotinoids came into wide use in the early 2000s. Unlike older pesticides that evaporate or disperse shortly after application, neonicotinoids are systemic poisons. Applied to the soil or doused on seeds, neonicotinoid insecticides incorporate themselves into the plant’s tissues, turning the plant itself into a tiny poison factory emitting toxin from its roots, leaves, stems, pollen, and nectar.

In Germany, France, Italy, and Slovenia, beekeepers’ concerns about neonicotinoids’ effect on bee colonies have resulted in a series of bans on the chemicals. In the United States, regulators have approved their use, despite the fact that the Environmental Protection Agency’s standard method of protecting bees from insecticides — by requiring farmers to refrain from applying them during blooming times when bees are most exposed — does little to protect bees from systemic pesticides.

“The companies believe this stuff is safe,” says U.S. Department of Agriculture (USDA) entomologist Jeff Pettis. “It is used at lower levels, and is a boon for farmers,” since neonicotinoids don’t require repeated application, nor wide broadcasting into the environment, he explains. Plus, years of research have shown that only very low levels of the chemicals are exuded from the pollen and nectar of treated plants.

But University of Padua entomologist Vincenzo Girolami believes he may have discovered an unexpected mechanism by which neonicotinoids — despite their novel mode of application — do in fact kill bees. In the spring, neonicotinoid-coated seeds are planted using seeding machines, which kick up

**The bat die-off ‘is the most precipitous wildlife decline in the past century in North America.’**

clouds of insecticide into the air. “The cloud is 20 meters wide, sometimes 50 meters, and the machines go up and down and up and down,” he says. “Bees that cross the fields, making a trip every ten minutes, have a high

probability of encountering this cloud. If they make a trip every five minutes, it is certain that they will encounter this cloud.”

And the result could be immediately devastating. In as-yet-unpublished research, Girolami has found concentrations of insecticide in clouds above seeding machines 1,000 times the dose lethal to bees. In the spring, when the seed machines are working, says Girolami, “I think that 90 percent or more of deaths of bees is due to direct pesticide poisoning.”

Girolami has also found lethal levels of neonicotinoids in other, unexpected — and usually untested — places, such as the drops of liquid that treated crops secrete along their leaf margins, which bees and other insects drink. (The scientific community has yet to weigh in on Girolami’s new, still-to-be-published research, but Pettis, who has heard of the work, calls it “a good and plausible explanation.”)

#### MORE FROM *YALE E360*

##### [The Spread of New Diseases: The Climate Connection](#)

As humans encroach on forested lands and as temperatures rise, the transmission of disease from animals and insects to people is growing. Now a new field, known as “conservation medicine,” is exploring how ecosystem disturbance and changing interactions between wildlife and humans can lead to the spread of new pathogens.

##### [What’s Killing the Tasmanian Devil?](#)

Scientists have been trying to identify the cause of a cancer epidemic that is wiping out Australia’s Tasmanian devils. Now new research points to an alarming conclusion: Because of the species’ low genetic diversity, the cancer is contagious and is spreading from one devil to another.

Two years after the honeybees started disappearing, so, too, did bats. The corpses of hibernating bats were first found blanketing caves in the northeastern United States in 2006. The disease that killed them, caused by a cold-loving fungus called *Geomyces destructans* — and dubbed White-nose Syndrome for the tell-tale white fuzz it leaves on bats’ ears and noses — has since destroyed at least one million bats. University of Florida wildlife ecologist John Hayes calls it “the most precipitous wildlife decline in the past century in North America.”

Like the mysterious *Batrachochytrium dendrobatidis* fungus infesting amphibians, *Geomyces* could be a novel pathogen, newly preying upon defenseless bat species. But scientists have also started to investigate whether pesticide exposure might be playing a role.

Bats are especially vulnerable to chemical pollution. They’re small — the little brown bat weighs just 8 grams — and can live for up to three decades. “That’s lots of time to accumulate pesticides and

contaminants,” points out Boston University bat researcher and Ph.D. candidate Marianne Moore, who is studying whether environmental contaminants suppress bats’ immune function. “We know they are exposed to and accumulate organochlorines, mercury, arsenic, lead, dioxins,” she says, “but we don’t understand the effects.”

Which, in the end, is the central dilemma facing pesticide-reliant societies. Proving, with statistical certainty, that low-level pesticide exposure makes living things more vulnerable to disease is notoriously difficult. There are too many different pesticides, lurking in too many complex, poorly understood habitats to build definitively damning indictments. The evidence is subtle, suggestive. But with the rapid decimation of amphibians, bees, and bats, it is accumulating, fast.



## **ABOUT THE AUTHOR**

Sonia Shah is an author and science journalist whose writing has appeared in *The Nation*, *New Scientist*, *The Washington Post* and elsewhere. Her third book, *The Fever: How Malaria Ruled Humankind for 500,000 Years*, will be published in 2010.

In a recent article for *Yale Environment 360*, she wrote about the emerging field of study of [how ecosystem disturbance and changing interactions between wildlife and humans](#) can lead to the spread of new pathogens.

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## [Beyond Pesticides Daily News Blog](#)

### [Biocontrol Research Advances as Genomes of Parasitic Wasps Are Studied](#)

(*Beyond Pesticides*, January 22, 2010) Gardeners have long turned to parasitic wasps and other beneficial insects to control unwanted insects, and new genetic research suggests even more ways to harness these species' potential. Scientists, led by John H. Werren, Ph.D., professor of biology at the University of Rochester, and Stephen Richards, Ph.D., at the Genome Sequencing Center at the Baylor College of Medicine, have sequenced the genomes of three parasitoid wasp species, revealing many features that could be useful as a "natural" alternative to pesticides. The study, "[Functional and Evolutionary Insights from the Genomes of Three Parasitoid Nasonia Species](#)" was published in the January 15, 2010 issue of the journal *Science*.

Already, many of these parasitoid wasps are hard at work, but because they are so small, most people are unaware of their existence. "Parasitic wasps attack and kill pest insects, but many of them are smaller than the head of a pin, so people don't even notice them or know of their important role in keeping pest numbers down," says Dr. Werren. "There are over 600,000 species of these amazing critters, and we owe them a lot. If it weren't for parasitoids and other natural enemies, we would be knee-deep in pest insects."

According to Dr. Werren, parasitoid wasps are like "smart bombs" that seek out and kill only specific kinds of insects. "Therefore, if we can harness their full potential, they would be vastly preferable to chemical pesticides, which broadly kill or poison many organisms in the environment, including us."

In addition to being useful for controlling insects and offering promising venoms, the wasps could act as a new genetic system with a number of unique advantages. According to researchers, their long term goal is to genetically modify parasitoids through selective breeding to improve their utility in pest control. The genome sequences provide tools and baseline information to advance toward this goal.

Three wasp genomes were sequenced for this study, all of which are in the wasp genus *Nasonia*. While fruit flies have been the standard model for genetic studies for decades, largely because they are small, can be grown easily in a laboratory, and reproduce quickly. *Nasonia* share these traits, but male *Nasonia* have only one set of chromosomes, instead of two sets like fruit flies and people. "A single set of chromosomes, which is more commonly found in lower single-celled organisms such as yeast, is a handy genetic tool, particularly for studying how genes interact with each other," says Dr. Werren. Unlike fruit flies, these wasps also modify their DNA in ways similar to humans and other vertebrates—a process called "methylation," which plays an important role in regulating how genes are turned on and off during development.

Among the future applications of the *Nasonia* genomes that scientists are hoping could be of use in pest control is identification of genes that determine which insects a parasitoid will attack, identification of dietary needs of parasitoids to assist in economical, large-scale rearing of parasitoids, and identification of parasitoid venoms that could be used in pest control. Because parasitoid venoms manipulate cell physiology in diverse ways, researchers are hoping they also may provide an unexpected source for new drug development.

While the prospect of utilizing parasitic wasps as a natural alternative to toxic pesticides is exciting, it is important that scientists proceed with caution. In some cases, introducing a new species to combat another can take a devastating toll on an ecosystem, especially if the beneficial insect itself has no predators. The article, "[When Good Bugs Go Bad](#)," by Doug Stewart of the [National Wildlife Federation](#) explains that introduction of beneficial insects can essentially turn invasive in the absence of the enemies and competitors that kept it in check back home.

In Hawaii, for instance, parasitic wasps from China and the U.S. mainland were released at least 100 times before 1950 by the Hawaiian Sugar Planters' Association to fight sugar-cane insects. In 1999 and 2000, ecologists collected more than 2,000 caterpillars of native moths and found exotic wasps developing from eggs in one in five native swamp caterpillars. And most of these, they discovered, were from just three species of parasitic wasps that were deliberately released in the cane fields. Without the native caterpillars that the wasps were using as hosts, insect-eating birds would starve.

Still, though, Mr. Stewart explains in his article that in classical biological control using exotic natural enemies to counter invasive insects examples of biocontrol insects that have themselves gone out of control are relatively few. When it does work, this method is far more benign, efficient, and precisely targeted than the usual method of controlling insect species: spraying their general whereabouts with toxic chemicals.

This has happened in the case of the [Asian lady beetle](#), which was imported as early as 1916 in an attempt to naturally control certain insect pests aphids, scale and other soft-bodied arthropods. While they are sometimes considered a nuisance in the absence of predators, they are still considered to be a beneficial insect.

To attract parasitic wasps naturally, [Gardeners.com](#) recommends supplying food and moisture; adult wasps feed on nectar and pollen. Plant alyssum, herbs from the dill family, and flowers from the daisy family, because small and shallow-faced flowers provide easy access to these tiny beneficial insects. If you have a bird bath or pond in your garden, place stones in the water so wasps have a place to land and drink safely.

Many beneficial insects are also available through garden centers. The most available are ladybugs, preying mantises, trichogramma for gypsy moth control, lacewings, insect parasitic nematodes, and fly parasites for control of breeding flies in stables and kennels. Some of the less common but still available insects include predatory mites to control mite pests, aphid midge for woolly adelgid control, leaf miner parasites and many, many more. Ask your garden center manager if they can get what you want since many beneficial insects have a short shelf life and must be ordered when needed.

For more information on *Nasonia* and emerging studies, visit the [Werren laboratory web site](#).

## OBSERVATORY

# A Simple Paper Test May Detect Pesticides

BY HENRY FOUNTAIN

DECEMBER 29, 2009

Testing food or water for pesticide contamination usually involves sending samples off to a laboratory for analysis, at significant cost in time and money.

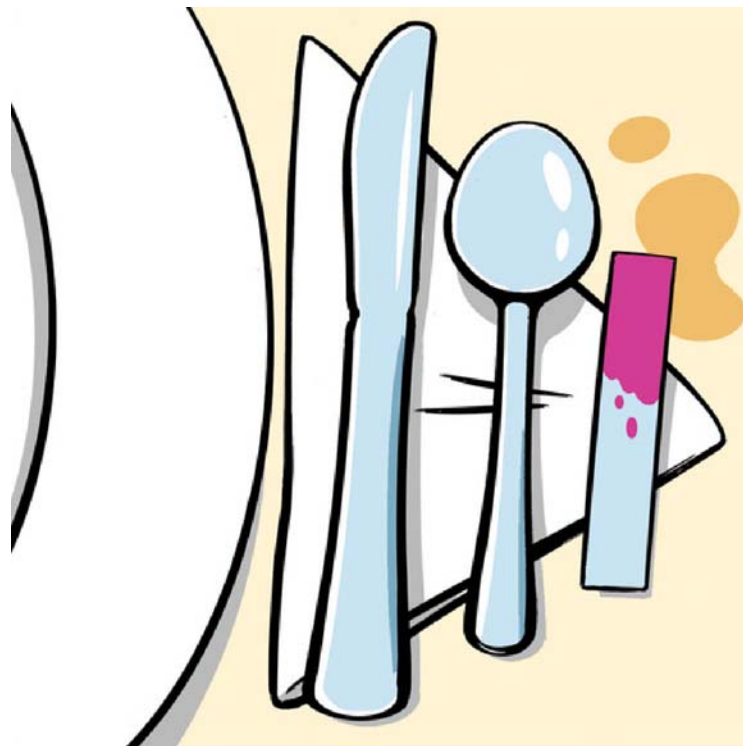
But scientists at [McMaster University](#) in Hamilton, Ontario, are reporting the development of a simple paper sensor — a “laboratory on a strip” — that can be dunked in a sample and give a reading a short time later, like a litmus test.

The sensor, developed by John D. Brennan and colleagues, makes use of the fact that organophosphate pesticides like diazinon inhibit the action of acetylcholinesterase, an enzyme involved in nervous system function.

The paper strip, which is [described](#) in the journal *Analytical Chemistry*, includes an area near one end containing the enzyme and an area near the other end containing a compound called IPA, which turns blue when broken down by acetylcholinesterase.

Dipping the enzyme end into a sample allows it to flow by capillary action to the enzyme. Then dipping the other end into water allows the IPA to flow to the enzyme, carried along by the water. If there are no pesticides in the sample, the paper will turn blue; if pesticides are present, the color will be less intense depending on the pesticide concentration.

The researchers say the strips, which have a long shelf life, could be a rapid and cost-effective way to test for environmental contaminants, particularly in poorer regions. ■



Chris Gash