Maine Board of Pesticides Control

# Miscellaneous Pesticides Articles March–April 2013

(***identified by Google Alerts or submitted by individuals***)

# Maine Organic Farmers Raise Concerns about Mosquito Control Proposals

03/07/2013 Reported By: Jennifer Mitchell

**As Maine begins to see more and more cases of mosquito-borne diseases, several efforts are now underway at the state level that would create a unified state plan to control some of Maine's tiniest pests. But those efforts, which include expanded use of pesticides, are raising some big questions within the agriculture community. Jennifer Mitchell reports.**

**Related Media**

**Maine Organic Farmers Raise Concerns about Mosquit** Listen *Duration: 2:38*

LD 292 sponsored by Lincoln House Republican Jeffrey Gifford, would create the structure of a state mosquito control program, similar to what already exists in other states. In Massachusetts, authorities can issue a pre-emptive strike against mosquito-borne illness, such as West Nile virus, by spraying pesticides over breeding areas that pose a danger.

Henry Jennings, director of Maine's Board of Pesticides Control, say it's unclear how such a strategy would be implemented here. "Maine's kind of in this unique position of never having done any public health mosquito control work, therefore, not having the legal framework in order to do it," he says.

The bill would make it easier for towns to get the authority they need to implement a spray plan. This would mean relaxed landowner notification procedures in some circumstances. If Maine's health authorities determine there's an absolute mosquito emergency, then towns would not need to get permission to spray, something Jennings says has caused some alarm, especially among organic gardeners and bee keepers.

Because of the sensitivity around the issue of pesticides, state health officials say that expansion would have to come with a good reason - and, says Dr. Stephen Sears from Maine Center for Disease Control and Prevention, Eastern equine encephalitis is a good reason.

"In the case of Eastern equine virus, we think that about 30 percent of people who get ill with it will actually die," Sears says. "So we're concerned because they're pretty serious diseases."

But some question the wisdom of an expanded pesticide application program, At a public hearing in Augusta for LD 292, Jon Olson from the Maine Farm Bureau warned that small growers would likely lose their status as organic farmers if their crops are in the line of fire. Olson said for at least one large organic blueberry farmer he knows, spray drift could spell disaster.

"If there's any residue on the product when he sells it to Japan because of aerial application to control mosquitos, he's going to lose his entire market," Olson told lawmakers.

A representative from the Maine Organic Farmers and Gardeners Association testified that Maine's $91 million organics industry could be in jeopardy unless the focus is shifted away from spraying, and onto other preventative measures, such as personal bug repellent.

Rep. Willam Noon, of Sanford, sits on that joint committee, and is himself an organic sheep farmer. Noon told colleagues on the committee that he's opposed to expanded pesticides, and would rather rely on a more natural remedy to control mosquitos: "We have dragon flies," he said.

The committee is likely to discuss the bill and concerns raised about expanded spraying of pesticides during a work session next week.

Return!

MAINE ORGANIC FARMERS AND GARDENERS ASSOCIATION

# Bulletin Board

MARCH 22, 2013



## Maine organic growers: Do you apply spinosad to your sweet corn? PyGanic on your carrots? You may need a pesticide applicator's license!

By April 1, 2015, any Maine grower who sells annually more than $1,000 worth of plants or plant products intended for human consumption and uses any general-use pesticide - one with an EPA registration number on the label - on those crops must be licensed by the Maine Board of Pesticides Control (BPC).

This law applies to those who grow fruits, vegetables, herbs and grains for human consumption; to growers of the above crops who make bread, jam, french fries, wine, cider, juice, etc., or sell produce to be processed into such products; and greenhouse growers selling fruit, vegetable and herb seedlings. The Agricultural Basic pesticide license is for growers who use only general-use pesticides on property they own or lease.

To obtain an Agricultural Basic pesticide applicator license, growers must pass the BPC core exam, which is based on the *Pesticide Education (Core) Manual* (available from UMaine Cooperative Extension at http://umaine.edu/ipm/pesticide-safety/certification-manual-prices/ or by calling 207-581-3880). The exam can be taken at the BPC office in Augusta (207-287-2731) or at county Cooperative Extension Offices. Contact the BPC office to have the exam mailed to the Extension office and then arrange with Extension to take the exam. Licenses expire on October 31 of the third year after issuance and cost $15. To maintain a license, growers must obtain three hours of continuing education credit during the three-year license period. For more information, see Chapter 33 of the BPC rules at www.thinkfirstspraylast.org.

BANGOR DAILY NEWS

# Let Maine farmers opt out of pesticide spraying

By Jody Spear, Special to the BDN
Posted March 12, 2013, at 1:55 p.m.

Last fall the national whistle-blower organization Public Employees for Environmental Responsibility warned that aerial spraying for mosquito control is futile.

Specifically, the group challenged claims made by Massachusetts officials that the state's July pesticide blitz in 21 communities against eastern equine encephalitis had reduced vector populations by 60 percent. PEER's New England director, Kyla Bennett, a biologist and former Environmental Protection Agency attorney, explained in a September 2012 press release why pesticides dropped from aircraft fail to hit their targets reliably and why, even with repeated deadly applications, spraying adult mosquitoes cannot possibly curb their life cycles. Larvae keep growing, and resistance develops with every spraying.

In Maine we ignore these warnings at our peril. The chemicals used to kill mosquitoes are devastating to birds, fish, bees and other beneficial insects, as well as to livestock, domestic animals and humans. Cancer, neurological disorders, endocrine disruption and respiratory damage head the list of illnesses known to be caused by these compounds.

Considering the environmental and social costs, we should always aim to reduce risk factors rather than increase them.

Nonetheless, efforts are under way in Augusta to amend existing pesticide rules, invalidating hard-won protections for organic farms, bodies of water and other "sensitive areas likely to be occupied" in the event that authorities declare a public health threat from mosquito-borne disease.

State Agriculture Department officials call the present standards "impractical for wide-area programs conducted in residential areas" and propose to deny residents the choice to opt out of "emergency" aerial-spraying bombardment.

The ground truth is that far more illness has been reported from pesticide poisoning than from exposure to West Nile virus and eastern equine encephalitis in places where aerial spraying has taken place.

Moreover, because mosquito-killing chemicals destroy natural predators such as dragonflies, they can have the unintended consequence of increasing the number of mosquitoes.

On a parallel track with the aforementioned rule changes under consideration by the Maine pesticide control board is a deceptive bill, LD 292, that would establish certain key provisions in state law. It would cancel out, in particular, the requirement to obtain permission from individual landowners before "emergency" aerial spraying is carried out and authorize the health and human services commissioner to declare mosquito-borne disease a public health threat.

Some of the directives of LD 292 would be commendable if they were spelled out in detail as meaningful pest management. Mosquito surveillance and monitoring, for example, and elimination of breeding sites with safe larvicides such as Bti are ways to avoid spraying by air. But like most pest management claims today, they are merely window dressing in a draft bill that would effectively undermine precautionary standards.

Many other steps are recommended before resorting to poisons broadcast indiscriminately from the air. Communities in some parts of the country have added mosquito-feeding fish in ornamental ponds and marshes. Others have put copepods (shrimplike crustaceans) in swamps, roadside ditches and small pools to eat mosquito larvae. Individual action can be taken also through the use of safe repellents (not DEET), long pants and sleeves, and large fans, along with citronella candles, to deter mosquitoes from backyard activities.

In Maine, a central fact to keep in mind is that mosquitoes cannot function below 50 degrees. Typically, according to the state epidemiologist, mosquitoes with West Nile virus have been found in September, close to the time hard frosts can be

expected, after which disease vectors pose no threat.

One of the last things Russ Libby, the revered Maine Organic Farmers and Gardeners Association leader, did in the weeks before his death in December was to write to the pesticide control board, imploring them to avoid the greater harm posed by aerial mosquito spraying.

“The health of citizens in the spray area,” he wrote, “should not be compromised for ineffective spraying programs. ... Occupants and owners of Maine properties must be allowed to ... [designate] no-spray zones around their [land, with the help of GIS-based technology].”

We would do great honor to the memory of Libby by sending letters now (by March 14) to the pesticide control board and to elected officials, especially those on the Agriculture, Conservation, and Forestry Committee and sponsors of LD 292. Urge that Chapters 20, 22, and 51 not be amended as proposed by the pesticide control board and that LD 292 ought not to pass in its current form.

It is imperative to preserve the right of organic farmers and others to use larvicides selectively and to opt out of wide-area “government-sponsored” spraying by aircraft.

There are economic implications to be considered as well as concerns for public health. Even lobbyists for commercial growers who ordinarily insist on using every chemical available to kill weeds and insects on their crops are speaking up at hearings, worried that residues from mosquito pesticides will make produce unsalable to the growing market for safe food. There are economic implications to be considered, as well as concerns for public health.

*Jody Spear is an editor and writer living in Harborside, in Hancock County. She is a regular observer of the Maine Board of Pesticides Control.*

http://bangordailynews.com/2013/03/12/opinion/let-maine-farmers-opt-out-of-pesticide-spraying/ printed on March 12, 2013

# Maine Government News

## State Releases Findings in Medical Marijuana Cultivation Investigation

March 26, 2013
Human Services

The use of pesticides in the growing of medical marijuana, the lack of proper security and the production and sale of an illegal form of marijuana were among more than 20 violations of state rules governing medical marijuana that were uncovered during a month-long investigation of the Wellness Connection of Maine.

*The Wellness Connection Admits to Several Rules Violations, Agrees to State's Terms to Remain Open*

**AUGUSTA** – The use of pesticides in the growing of medical marijuana, the lack of proper security and the production and sale of an illegal form of marijuana were among more than 20 violations of state rules governing medical marijuana that were uncovered during a month-long investigation of the Wellness Connection of Maine.

The Division of Licensing and Regulatory Services (DLRS), which oversees the Maine Medical Marijuana Program, shared the results of the investigation with officials from the Wellness Connection in Auburn earlier today. The facility has agreed to the terms and conditions required by State Regulators in order for the business to remain open.

The Wellness Connection has dispensaries in Brewer, Hallowell, Thomaston and Portland and grows marijuana in Auburn and Thomaston.

DLRS Director Kenneth Albert said that the investigation of the Wellness Connection began at the Auburn grow site, but was extended to all of the company's facilities. The end result was a laundry list of violations, the most serious of which included the use of pesticides in the growing operation.

"Part of our agreement with the Wellness Connection is the requirement that all patients will be notified that pesticides have been used and that this practice will cease immediately," Albert said. "The use of pesticides on medical marijuana is not allowed by state law, as the harmful effect of pesticides when ignited and inhaled is not imminently known." Albert said DLRS identified nine pesticides that were on marijuana that was used in tinctures, baker's mix and all strains dispensed by the Wellness Connection.

In addition, Albert said that the company was selling a product known as keif, which is not permissible under state law. Keif refers to the resin glands of cannabis, which may accumulate in containers or be sifted from loose dry cannabis buds. It contains a much higher concentrate of psychoactive cannabinoids than medicinal marijuana.

There were many other violations listed in the Statement of Deficiencies pertaining to security, governance, inventory control and disposal of unused products. The agreement between DLRS and the Wellness Connection is designed to ensure the safety of medical marijuana patients and is in effect for two years.

As part of the agreement, the Wellness Connection must submit weekly status reports until the program is in full compliance with all conditions.

"We will be extremely active in assuring that the Wellness Connection abides by the rules governing the medical marijuana program,'' Albert said.

Consent agreement - http://www.maine.gov/dhhs/consent-agreement-wellness-connection.pdf

Patient notification - http://www.maine.gov/dhhs/patient-notification.pdf

KENNEBEC JOURNAL



March 26, 2013 at 12:02 AM

# State: Marijuana supplier used pesticides, violated rules

By Michael Shepherdmshepherd@mainetoday.com
State House Bureau

**AUGUSTA** — A state investigation of Maine's largest **medical marijuana** dispensary group has revealed "a laundry list" of violations of state law and program rules, including pesticide use on marijuana plants, the **Department of Health and Human Services** said Monday.

click image to enlarge

(FILE) Wellness Connection of Maine's Portland marijuana dispensary, located at the end of an alley off Congress Street behind the Local 188 restaurant. Photographed March 29, 2012.`

Shawn Patrick Ouellette/Staff Photographer

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- **Dangers of pesticides on cannabis pretty hazy**

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**Wellness Connection Consent Agreement: terms and conditions**
**Patient notification with list of pesticides used**



Wellness Connection of Maine also lacked proper security and sold an illegal marijuana derivative, according to findings from the investigation, released Monday.

The group will be allowed to continue operating its four dispensaries and sell the marijuana that was treated with pesticides, even though a state official said he doesn't know whether it could harm patients.

The DHHS said Wellness Connection of Maine, which runs dispensaries in Portland, Hallowell, Thomaston and Brewer serving about 2,400 patients, committed 20 rule violations in its cultivation facility in Auburn and other facilities.

Through the second half of last year and all of this year, nine types of pesticides were used on medical marijuana dispensed by Wellness Connection, said Kenneth Albert, director of the DHHS Division of Licensing and Regulatory Services. Pesticides also were found in baker's mix and tinctures used by patients, and bugs were found near marijuana that was to be packaged for sales.

To keep operating, the group had to sign a consent agreement with DHHS, Albert said. According to the agreement, the group must stop using pesticides, provide weekly status updates to the state and get a license for a working kitchen, along with other conditions.

He said the state will allow marijuana on the shelves at Wellness Connection's dispensaries to be sold, even if it is tainted with pesticides.

Every patient will be handed or mailed a notice describing the nine pesticides until the state is confident the marijuana being sold is pesticide-free, Albert said.

"What was important for us was to allow patients to make that choice for themselves, and in doing that we will be monitoring the dispensaries," he said.

Maine's medical marijuana program doesn't allow for pesticides to be applied to the marijuana. Albert said Wellness Connection used general-use pesticides, which are used in other areas of agriculture.

Although many of the pesticides -- such as one with sesame oil as its main active ingredient -- appear to be organic, program rules don't distinguish between organic and non-organic pesticides, Albert said.

He said he doesn't know whether patients could be harmed by the pesticides -- only that he can't assure patients which of the nine pesticides were used to treat their strain of marijuana.

Albert said one employee's tip to a state hotline started the investigation. While the DHHS was investigating, he said, it received 22 more tips from employees.

A state document that outlines the findings says an employee "admitted to applying pesticides, at the direction of senior leaders, over the last several months." Later, several employees indicated that pesticides had been used, the document says.

On March 4, the first day of the investigation, Wellness Connection Executive Director Becky DeKeuster was interviewed about the possibility of pesticide use, Albert said.

The state document says DeKeuster "indicated staff has voiced concern about the use of pesticides, and that patients are not being made aware of such use on their medicine."

But in an interview with the Portland Press Herald on March 8, DeKeuster called the state's investigation "a comprehensive regulatory inspection" and said she wasn't aware of any cultivation rule violations.

A statement posted on the group's website and Facebook page on March 9 said, "At this time, we are using only mechanical and environmental methods of contaminant abatement. We will continue to communicate with our patients about the quality and safety of their medicine and look forward to receiving the inspection report" from the DHHS.

DeKeuster didn't respond to a message left on her cellphone Monday evening.

Paul McCarrier, a lobbyist for Medical Marijuana Caregivers of Maine, said, "It's really a tragedy for the patients."

He said the findings show that Wellness Connection's upper management was "encouraging workers to be deceitful" to "people who look to them to have a safe, clean medicine."

The state also cited Wellness Connection of Maine for its "security, governance, inventory control and disposal of unused products."

For example, employees lacked the necessary registration to work around marijuana; plumbing and electrical contractors were allowed to work near the plants; and two ounces of marijuana from the dispensary in Hallowell went unaccounted for in a check by the DHHS.

Wellness Connection dispensaries also were selling "kief" -- resin that comes from cannabis and can accumulate in containers or be shaken or sifted from dried buds, the state said. Albert said program rules have long been interpreted to prohibit sales of kief, which produces a high concentration of psychoactive ingredients.

McCarrier said that if Wellness Connection was producing kief, it may have been removing it from plants it would sell -- effectively watering down the marijuana's medicinal quality to boost profits.

The state also cited the group for a managerial conflict of interest, prohibited in dispensaries by state law. It says Patricia Rosi-Santucci was hired as the group's vice president of marketing in September 2012, while she was a member of the group's board of directors. Documents say she's now the group's chief operating officer.

The state didn't learn of her resignation from the board until this month, and Albert said that when she assumed her executive role, she was one of only three board members, which was an "inherent conflict."

Albert said Rosi-Santucci is married to Jacques Santucci, a Portland-based business consultant who has long been linked to Wellness Connection of Maine.

The state document says "Jacques S." has been serving as acting chief financial officer, but he doesn't have the necessary identification card to do so.

Jacques Santucci didn't return a call seeking comment Monday evening.

Albert said that in assigning responsibility for violations, "the buck stops with the board of directors," which is ultimately in charge of the group.

Despite the violations, he said he's confident that Wellness Connection of Maine can rebound

and grow marijuana without pesticides.

"If the commissioner or I were uncomfortable with their ability to come into compliance and produce medicine at the rate of production they need, we would be having a very different discussion with Wellness Connection today," he said.

McCarrier said he wouldn't speculate on the violations' effect on the dispensaries' business, but the group will have to atone to keep patients' trust.

"I'm trying to imagine how they can try to make it up to their patients or the general community," McCarrier said. "It's tough to think of what that will take to make people have trust in them again."

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KENNEBEC JOURNAL



Posted: March 26, 2013
Updated: March 27, 2013 at 6:31 AM

# Dangers of pesticides on cannabis pretty hazy

By Michael Shepherdmshepherd@mainetoday.com
State House Bureau

**AUGUSTA** — Five of the nine pesticides that state officials say were used by Maine's largest **medical marijuana** dispensary group contain active ingredients that are safe for many uses and federally approved for use on tobacco, according to Maine's pesticide toxicologist.

## Related headlines

- **State: Marijuana supplier used pesticides, violated rules**

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**Patient notification with list of pesticides used**

But the state says it can't vouch for the pesticides' safety on marijuana because little is known about their interaction with the drug when smoked.

Because marijuana is illegal under federal law, regulators don't set standards for pesticide use on the plants. That's why Maine prohibits pesticides in its medical marijuana program.

On Monday, the state **Department of Health and Human Services** said its investigation of Wellness Connection of Maine, the operator of four of Maine's eight medical marijuana dispensaries, revealed 20 violations of state law and program rules, from pesticide use to security breaches to a managerial conflict of interest.

In response to a request by the Portland Press Herald, Labelle Hicks, toxicologist for the Maine Board of Pesticides Control, analyzed the nine pesticides that the DHHS said Wellness Connection used through the second half of last year and all of this year.

She said the active ingredients are either natural substances or synthetic versions of natural substances.

"If you were to let these break down into the environment, you basically end up with the basic building blocks of life," Hicks said.

Although its toxicologist said the pesticides are relatively safe, the Board of Pesticides Control is considering whether Wellness Connection violated state pesticide-application law, said Director Henry Jennings. He said the maximum penalty for a single, first-time violation is a $1,500 fine.

The DHHS began its investigation of Wellness Connection on March 4, in response to a complaint by an employee of the group.

On Monday, Kenneth Albert, director of the DHHS Division of Licensing and Regulatory Services, said the state "is unable to, because of the lack of research in the industry, know what the risk is associated with igniting pesticides on cannabis."

He said that because they are legal, general-use pesticides -- pesticides anyone can apply -- the state is allowing Wellness Connection to sell the treated marijuana to patients.

Albert said many patients called his office after the investigation was publicized in early March, and none reported ill effects from the marijuana.

As part of a consent agreement with the state, Wellness Connection must notify patients in writing that pesticides were applied to the marijuana before it sells the drug to them. That will be required until regulators are confident that the marijuana being sold is pesticide-free, Albert said.

He said the market will decide whether it wants Wellness Connection's product.

Patients can use other dispensaries or designate caregivers, who are authorized to grow marijuana for as many as six patients.

"Allowing the patient to make that decision for themselves was appropriate under the circumstances," Albert said Monday.

Wellness Connection serves 2,400 patients through dispensaries in Portland, Hallowell, Thomaston and Brewer, and grows marijuana at its cultivation center in Auburn.

The more marijuana is grown in one place, the quicker pests such as spider mites can ruin crops, say cultivation experts.

Many in the medical marijuana industry denounce pesticide use. But Dr. Dustin Sulak, an osteopath who is known for recommending marijuana for many of Maine's patients, said using pesticides, though troubling, is better than losing a crop.

"I think it would be preferable for patients to use medical marijuana without toxic pesticides on it; however, it's not a plain black-and-white picture," he said. "If, say, four of eight dispensaries go without being able to supply their patients, then I think the net effect on the health of this population would be worse."

He said, "If we're going to really grow these big indoor grow rooms full of cannabis without any pesticide option, we're probably going to have a hard time supplying the people of the state who need this through the dispensary model."

But Dan Tomaski, who runs Northern Lab Services, a firm in northern Michigan that tests medical marijuana for purity and potency, said destroying a crop is better than tainting it, especially for sensitive patients with ailments as serious as cancer or AIDS.

"If you don't eradicate (pests), they will build up an immunity and you'll have to use a stronger

pesticide," he said.

"I recommend no one spray pesticides on medical marijuana or anything that you smoke, for Pete's sake," Tomaski said. "Theoretically, you could kill someone."

State Rep. James Dill, D-Old Town, a pest management specialist with the University of Maine's Cooperative Extension, said he has been asked for tips on how to control pests in marijuana growing operations.

He said he can't recommend much more than spraying pests off with streams of water. Because no pesticides can be used, "that's about all you've got available to you," he said.

Dill said he is concerned about pesticides' potential effects on smokers' lungs, because the respiratory system could be more sensitive to pesticides than the skin or the digestive system.

For example, a reference sheet on Serenade Garden Disease Control, one of the pesticides that Wellness Connection was cited for using, says it can be used in organic gardening of vegetables, fruits and flowering plants.

It also says the pesticide shouldn't be inhaled, even though the federal Environmental Protection Agency has approved it for use on tobacco, said Hicks, with the Maine Board of Pesticides Control.

Hicks said it's likely that patients who smoke marijuana treated with one of the five pesticides allowed for tobacco use won't have ill effects.

But the federal government's record on pesticide use in tobacco isn't perfect. In 2003, the Governmental Accountability Office criticized the EPA for not examining the long-term effects of pesticides when smoked.

Allen St. Pierre, a Maine native who is executive director of the National Organization for the Reform of Marijuana Laws, said the state's investigation into Wellness Connection reflects a changing public sentiment about marijuana.

He said Maine's concern about pesticide use is "a watershed moment" in American medical marijuana politics, especially with a federal government that still says marijuana is a harmful drug with no medicinal benefits.

"I've been here 23 years, and the irony that the state is now concerned with the quality of marijuana is tremendous," St. Pierre said.

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**STATE OF MAINE**
**DEPARTMENT OF HEALTH AND HUMAN SERVICES**
**DIVISION OF LICENSING AND REGULATORY SERVICES**
**11 STATE HOUSE STATION**
**AUGUSTA, MAINE 04333-0011**

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| **IN THE MATTER OF:** | ) | |
| | ) | **CONSENT AGREEMENT** |
| NORTHEAST PATIENTS GROUP, D/B/A WELLNESS CONNECTION OF MAINE, | ) | |

## INTRODUCTION

This document is a Consent Agreement concerning the Certificate of Registration for 4 Registered Dispensaries operated by Northeast Patients Group d/b/a Wellness Connection of Maine (hereinafter referred to as "Wellness Connection") in the State of Maine. The parties to this Agreement are: the Maine Department of Health and Human Services, Division of Licensing and Regulatory Services, Medical Use of Marijuana Program (hereinafter referred to as the "Department"), Wellness Connection, Becky DeKeuster, Executive Clinical Director of Wellness Connection, Patricia Rosi-Santucci, Chief Operating Officer of Wellness Connection and Paul Sevigny, President of the Wellness Connection Board of Directors.

## STATEMENT OF FACTS

1. Becky DeKeuster is the Executive Clinical Director of Wellness Connection. Patricia Rosi-Santucci is the Chief Operating Officer of Wellness Connection. Paul Sevigny is the President of the Wellness Connection Board of Directors.

2. The 4 Registered Dispensaries are located at the following addresses: 1) 115 Water Street, Hallowell, Me. 04347, 2) 685 Congress Street, Portland, Me. 04102, 3) 221 Dirigo Drive, Brewer, Me. 04412, and 4) 153 New County Road, Thomaston, Me. 04861. These 4 Registered

Dispensaries have an additional cultivation site located in Thomaston and Auburn. The term Registered Dispensary includes the corresponding additional cultivation site.

3. Ms. DeKeuster, Ms. Rosi-Santucci, Mr. Sevigny and Wellness Connection are responsible for operating the 4 Registered Dispensaries in compliance with the Maine Medical Use of Marijuana Act (the Act) and the Maine Medical Use of Marijuana Rules (the Rules).

4. On March 4, 2013 and March 6, 2013, the Department conducted an unannounced inspection of Wellness Connection at the Auburn cultivation site. On March 14, 2013, the Department conducted an unannounced inspection of Wellness Connection at the Thomaston cultivation site and the 4 Registered Dispensaries. Based upon these inspections, the Department determined that Wellness Connection was not in compliance with the Act or the Rules. See attached Statement of Deficiencies dated March 25, 2013.

## AGREEMENT

By virtue of this Consent Agreement, the Department, Ms. DeKeuster, on behalf of Wellness Connection, Ms. Rosi-Santucci, on behalf of Wellness Connection, Mr. Sevigny, on behalf of Wellness Connection and Wellness Connection hereby agree to the following terms and conditions of this Consent Agreement:

1. The parties agree that the above statement of facts is true to the best of their knowledge and belief.
2. The parties agree that it is the legal responsibility of Wellness Connection to operate in compliance with the Act and the Rules.
3. The parties agree that Wellness Connection will provide written notice to all patients, prior to conducting transactions, about the unlawful use of pesticides in the production of their medicinal marijuana. (See attached notice). The parties agree that Wellness

Connection will not have to provide this written notice to patients once the Department has determined that the cultivation of medical marijuana for sale by Wellness Connection has not been treated with pesticides.

4. If for some reason Becky DeKeuster, Patricia Rosi-Santucci, or Paul Sevigny are no longer employed or serving as a board member of Wellness Connection, the parties agree that any reference in this Consent Agreement to "Executive Clinical Director", "Chief Operating Officer" or "President of the Wellness Connection Board of Directors" means any individual who is subsequently employed or serving in those positions.

5. This Consent Agreement shall become effective immediately upon signing by the parties and shall remain in effect for two (2) years from the effective date of the Consent Agreement.

6. Wellness Connection, Ms. DeKeuster, Ms. Rosi-Santucci and Paul Sevigny hereby agree to comply with the following conditions upon all parties signing this Consent Agreement:

**A. Immediately upon the effective date of the Consent Agreement, the following shall be met and maintained throughout the period of the Consent Agreement:**

1. Wellness Connection will cease production and sale of kief (a/k/a kiefer). Kief refers to the resin glands (or trichomes) of cannabis which may accumulate in containers or be sifted from loose dry cannabis buds with a mesh screen or sieve. Kief contains a much higher concentration of psychoactive cannabinoids, such as THC, than other preparations of cannabis buds from which it is derived.

2. Wellness Connection will cease utilization of pesticides – including fungicides – in the production of medical marijuana.

3. Wellness Connection will post, in public view, this Consent Agreement, Statement of Deficiencies and the attached notice at each of the 4 Registered Dispensaries.

4. Wellness Connection will secure cultivation locations to permit access only by the individual authorized to cultivate the marijuana – registered cardholders who are

principal officers, board members, or employees of a registered dispensary when acting in his or her official capacity.

5. Wellness Connection will resolve conflicts of interest with members of the Board of Directors and implement policies and procedures to prevent such conflicts in the future, including the prevention of any and all direct and indirect gains which could accrue to the member as a result of actions or decisions made in the capacity of board authority.

6. Wellness Connection will submit to frequent inspections by the Department to evaluate regulatory compliance without contesting the reasonableness of said inspections.

7. Wellness Connection will submit weekly regulatory status reports to the Department demonstrating progress on goals until such time that compliance is attained on all deficiencies.

8. Wellness Connection will implement and enforce inventory control methods to track all plant growth, unprepared medical marijuana, prepared marijuana, and other medicinal marijuana products in the cultivation sites, in transport, and in the dispensaries.

9. Wellness Connection will acquire a food establishment license related to the production of tinctures and any other goods containing marijuana for consumption by a qualifying patient.

10. Wellness Connection will implement a Department-approved policy for safe and effective disposal of excess or otherwise unusable marijuana grown at cultivation sites.

12. Wellness Connection will implement security procedures at access points to cultivation sites that include identification and visualization of individuals desiring entrance to the facility prior to opening access points.

13. Wellness Connection will implement and enforce policies and procedures that prevent work or affiliation of a principal officer, board member, or employee before he or she is issued a registry identification card.

14. Wellness Connection will mail a copy of the attached notice to all former and current qualifying and registered patients who designated Wellness Connection for cultivation of medical marijuana. Wellness Connection will provide the Department with the list of all former and current patients who were sent this notice.

**B. Within thirty (30) days of the effective date of the Consent Agreement, the following shall be met and maintained throughout the period of the Consent Agreement:**

1. Wellness Connection will develop a system to ensure that plants are tagged in a manner that documents and demonstrates the patient's designation for cultivation, and which allows for documentation of patients who have been dispensed medication from a given plant.

2. Wellness Connection will submit to the Department an adopted copy of the policy and procedure manual for Wellness Connection of Maine.

3. The Board of Directors for Wellness Connection of Maine will adopt an amendment requiring Wellness Connection to have an active and dynamic compliance subcommittee. The foregoing subcommittee will submit, for approval, to the Department, a regulatory compliance plan within ninety (90) days of the signing of this Agreement.

**The following terms are also agreed to:**

1. This Consent Agreement may not be appealed and its terms may only be amended by the written agreement of all the parties hereto.

2. This Consent Agreement does not preclude the Department from conducting any necessary complaint investigations, or other surveys needed to conduct its regular business.

3. This Consent Agreement is a public record within the meaning of 1 M.R.S.A. § 402 and becomes effective immediately upon signing by the parties.

4. Nothing in this Consent Agreement shall be construed to affect any right or interest of any person not a party hereto.

5. Those signing on behalf of the parties acknowledge by their signatures that they have read and understand this Consent Agreement; that they have had the opportunity to consult with an attorney before signing this Consent Agreement; that they have signed this Consent Agreement of their own free will; that they have the authority to execute this Consent Agreement on behalf of the respective parties and that their signatures hereto will bind the respective parties fully, without the need for any other or further action; and that, by signing this Consent Agreement, they agree to abide by all the terms and conditions set forth herein.

Dated: 3/25/13

BECKY DEKEUSTER
Executive Clinical Director of the
Wellness Connection

Personally appeared the aforenamed Becky DeKeuster, Executive Director of the Wellness Connection, with the authority to act on behalf of the Wellness Connection, first being duly sworn, and did make oath to the truth of the foregoing by her subscribed.

STATE OF MAINE
KENNEBEC, ss.
Subscribed and sworn to before me
this 25 day of March, 2013.

Notary Public/Attorney-at-Law

Dated: 03.25.2013

PATRICIA ROSI-SANTUCCI
Chief Operating Officer of Wellness
Connection

Personally appeared the aforenamed Patricia Rosi-Santucci, Chief Operating Officer of the Wellness Connection, with the authority to act on behalf of the Wellness Connection, first being duly sworn, and did make oath to the truth of the foregoing by her subscribed.

STATE OF MAINE
KENNEBEC, ss.
Subscribed and sworn to before me
this 25 day of March, 2013.

Notary Public/Attorney-at-Law

Dated: 03/25/2013

PAUL SEVIGNY
President of the Wellness Connection
Board of Directors

Personally appeared the aforenamed Paul Sevigny, President of the Wellness Connection Board of Directors, with the authority to act on behalf of the Wellness Connection, first being duly sworn, and did make oath to the truth of the foregoing by him subscribed.

STATE OF MAINE

KENNEBEC, ss.
Subscribed and sworn to before me
this 25 day of March, 2013.

Lucinda R. Claveau
Notary Public/Attorney-at-Law

Dated: 3-25-2013

KENNETH ALBERT
Director, Division of Licensing and
Regulatory Services, Department of
Health and Human Services

Personally appeared the aforenamed Kenneth Albert, Director of the Division of Licensing and Regulatory Services, Department of Health and Human Services, first being duly sworn, and did make oath to the truth of the foregoing by him subscribed.

STATE OF MAINE
KENNEBEC, ss.
Subscribed and sworn to before me
this 25 day of March, 2013.

Lucinda R Claveau
Notary Public/Attorney-at-Law

# ***NOTICE***

***TO ALL PATIENTS (PAST AND PRESENT) DESIGNATING WELLNESS CONNECTION***

***(To be posted and provided to qualifying patients PRIOR TO ALL TRANSACTIONS.)***

Wellness Connection has operated its Registered Dispensary in violation of the Maine Medical Use of Marijuana Act (the Act) and the Rules Governing the Maine Medical Use of Marijuana Program (the Rules – Section 2.7.4.2) by ***treating its medical marijuana with the following general use pesticides***:

| PESTICIDE NAME | ACTIVE INGREDIENTS |
|---|---|
| Senarade Disease Control (Admittedly Used) | QST 731 strain of dried Baccillus subtilis 1.34% |
| Gnatrol WDG biological larvicide (Admittedly Used) | Bacillus thuringiensis subsp. Israelensis, strain AM 65-52 37.4% fermentation solids and soluables |
| Monterey Garden Insect Spray (Admittedly Used) | Spinosad (mixture spinosyn A & spinosyn D) 0.5% |
| Actinovate Lawn & Garden Fungicide (Admittedly Used) | Streptomyces lydicus WYEC 108 00.0371% |
| Forbid 4F Ornamental Insecticide/Miticide (Found on site but alleged to not have been used.) | Spiromesifen 42.5% |
| Monterey Take Down Garden Spray (Found on site but alleged to not have been used.) | Pyrethins 0.5% Canola Oil 89.5% |
| CX Hydroponics Tanlin Drops (Admittedly Used) | Chitin |
| Doktor Doom Total Release Fogger (Admittedly Used) | Pyrethrins |
| Organocide 3 in 1 Garden Spray (Admittedly Used) | Sesame Oil |

For several months marijuana plants that had pesticides applied were utilized to produce various medical cannabis products including **tinctures, baker's mix, and all strains of medical marijuana dispensed by Wellness Connection of Maine.**

Pursuant to 22 M.R.S. § 1471-C, the term **"pesticide"** means (1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, and (3) any nitrogen stabilizer. The term "pest" means any insect, rodent, nematode, fungus, weed, or any other form of terrestrial or aquatic plant or animal life or virus, bacteria or other micro-organism, except viruses, bacteria or other micro-organisms on or in living man or other living animals. Fungicides, rodenticides, and insecticides are forms of pesticides. The Environmental Protection Agency (EPA) has determined that "organic" approved pesticides are pesticides by EPA definition, and that there is no distinction between "organic" and non-organic pesticides under EPA pesticide definition.

# Maine medical marijuana workers unionize

**Portland Press Herald / March 30, 2013**

HALLOWELL, Maine (AP) — Employees at Maine's largest medical marijuana dispensary group have unionized, but the head of the company that employs more than 40 people won't say if they'll recognize the union, officials say.

The Friday announcement that many of the employees of Wellness Connection of Maine had unionized came days after the Maine Department of Health and Human Services determined the company had violated 20 state laws and rules, many surrounding pesticide applications.

Barbara Heap, an employee at the company's Auburn cultivation center, said she and others attempted to address state violations with management before reporting them to regulators.

"For our employer to put profits and convenience over patient safety and health is not only wrong, but also morally reprehensible," she said.

The Portland Press Herald ((http://bit.ly/10ohOTJ) reports that Wellness Connection Executive Director Becky DeKeuster wouldn't directly answer questions on whether the company would recognize the union. "With a union or without a union, WCM is going to continue to improve," she said.

"We're dealing with a lot of challenges," DeKeuster said. "The end result is going to be improved conditions for them, for our patients, for everybody."

DeKeuster said treatment of plants with certain natural pesticides has been common in the industry. She said the group will abide by Maine's standard. "This is a great opportunity for us to establish standards," DeKeuster said.

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Information from: Portland Press Herald, http://www.pressherald.com

http://www.mainebiz.biz

# Pesticides, mold among Auburn pot grower's violations

3/26/2013

Investigators found bugs and mold — which prompted the illegal application of pesticides — at an Auburn medical marijuana growing operation that supplies four Maine dispensaries. The company, which is the state's largest medical marijuana distributor, was cited for 20 violations.

The Sun Journal reported a weeks-long investigation of the Wellness Connection of Maine's Auburn growing facility found the operation, in response to bugs and mold, began illegally using pesticides on its marijuana plants. The paper reported the company, which serves around 2,400 patients, has signed a consent agreement with the state, stipulating a number of conditions, including that the company stop using pesticides.

Many states allow the use of pesticides in medical marijuana growing operations but Maine does not, citing uncertain results when pesticide-treated marijuana is smoked.

State regulators also ordered the company to stop selling an illegal form of marijuana, called kief or kiefer, and to submit to frequent state inspections.

The Sun Journal reported that multiple employees, on the condition of anonymity, had contacted the paper over the past two weeks, describing what they called unsanitary conditions at the Auburn growing facility. In February, employees told the paper they staged a one-day walk-out over those issues, prompting management to promise changes.

Regulators told the paper the state was prepared to revoke the company's license Monday if it did not sign an agreement with the state to correct a number of violations that also included a lack of property security, allowing unlicensed workers on site and failing to properly inventory stock.

The paper also reported investigators found a conflict of interest with the company's board of directors, as one board member, Patricia Rose-Santucci, was also serving as the company's vice president of marketing.

The paper reported the company will be allowed to sell its remaining pesticide-treated marijuana as long as it notifies patients that pesticides were used.

# Discovery of Pesticides in Medical Marijuana has Maine Patients Concerned



03/27/2013 Reported By: Susan Sharon

**This week's consent agreement between Maine's largest medical marijuana dispensary operator and state regulators has some patients questioning the source of their medicine and some looking to go elsewhere. Wellness Connection of Maine has agreed to discontinue the illegal application of pesticides in its grow operation. It must also provide weekly status reports with the Division of Licensing and Regulation for the next two years. But as Susan Sharon reports, the case is also fueling interest in organically grown cannabis.**

| Related Media | |
|---|---|
| Discovery of Pesticides in Medical Marijuana has M | Listen Duration: 3:56 |

State regulators say they found nine pesticides used on medical marijuana plants, and in tinctures and bakers mix sold at Wellness Connection's dispensaries in Portland, Hallowell, Brewer and Thomaston. There were also problems with lax security and the sale of an illegal product traced back to a

large, indoor grow facility in Auburn.

As part of a consent agreement with the state, Wellness Connection is expected to end the practices and notify its 2,500 patients.

So far, Brian Lee says he only knows what he's read in the papers. He's received no communication. And he says, as a patient of Wellness Connection's, he's angry that the dispensary operator has been allowed to remain in business.

"When we put poison on things that you ingest, it's foolishness, and they're slapping us all right in the face and they think we're ignorant," he says.

Lee says he got a prescription for medical marijuana after a motorcycle accident that left him with chronic pain. He's been getting his medicine at Wellness Connection's Portland dispensary. But he says that will soon come to an end.

"Well, I won't be going to them," he says. "If I decide to continue with alternative medicine, I'll look to somebody else who's doing it more naturally and not with pesticides. I don't want poison in my medicine, thank you very much."

Brian Lee is not the only one reconsidering where he gets his medical marijuana, says Paul McCarrier, a lobbyist with the Medical Marijuana Caregivers Association of Maine. McCarrier represents growers who are allowed to provide medical marijuana to five patients. And he says he's been getting dozens of calls since the consent agreement involving Wellness Connection was made public earlier this week.

"We're getting dozens of calls from patients who are currently, or are formerly, patients at Wellness Connection who are very concerned that they have been using medicine that has been - not only had pesticides used on it, but also may have mold," McCarrier says. "And many of these patients could be immune-compromised, and if any of these patients who are immune-compromised have been smoking a moldy product, then they may be having additional health issues when this medicine

should have been helping them."

Speaking with reporters earlier this week, the director of the Division of Licensing and Regulatory Services, Kenneth Albert, said one of the reasons the state does not allow pesticide use in the production of medical marijuana - for caregivers or dispensaries - is because the health effects are unknown. Albert's department oversees Maine's Medical Marijuana Program.

"The state is unable to - as I think any state who has a medical marijuana program - is unable to, because of a lack of research in the industry, know what the risk is associated with igniting pesticides on cannabis," he says.

Albert says there is one documented case in California in which a medical marijuana patient died after inhaling cannabis laden with pesticides. But the lack of information about the health effects related to pesticide use on cannabis is just one reason Paul McCarrier says some patients prefer to get their medicine from caregivers, or may choose to grow their own.

"It comes down to what kind of agriculture are you looking to do? The caregiver is the small, organic farmer model. Well, then you have the dispensary, which is like the large, agri-business," he says. "I think it's all about having an informed consumer and that these patients should have a choice of what medicine they want to use."

Allen St. Pierre, of the group NORML - the National Organization for the Reform of Marijuana Laws - says he's impressed that Maine regulators are setting quality control standards for medical marijuana.

On the West Coast, he says, "veganic cannabis" grown without animal byproducts sells for top dollar. And he thinks it won't be long before consumers demand a green or organic label for medical marijuana. "The situation in Maine right now indicates that that's likely where the industry's going."

Several calls and emails to officials with Wellness Connection of

Maine this week seeking comment for this story were not returned.

Return!

BANGOR DAILY NEWS

# Ogunquit could be first Maine municipality to ban pesticides

By Samantha Stephens, York County Coast Star
Posted March 22, 2013, at 6:21 a.m.

OGUNQUIT, Maine — The Select Board heard several proposals for ordinance changes at a meeting held Tuesday, March 19.

Michael Horn, chair for the Conservation Commission, approached the board asking to amend an ordinance that forbids the use of pesticides and herbicides on town lands to be extended to encompass private property as well.

Horn said not only is it safer for the waterways and healthier for the town's ecology, but there were more than 145,000 calls to poison centers and 65,000 incidents nationwide last year involving children relating to pesticide issues.

If voters approve the ordinance change at the election scheduled for June 11, Ogunquit would be the first municipality in the nation to forbid pesticides townwide.

Resident Don Simpson approached the podium to voice his support.

"I absolutely support it. It benefits pets as well," Simpson said. "There's no reason not to support the ordinance change."

Selectman Chris Jarochym agreed with the ordinance, saying that being environmentally conscious for his own family and children as well as the town is important to him.

In other board news, Judy Dennis, owner of Bandito's Mexican Grill on Shore Road, submitted a citizen's petition to extend the business district, currently stretching from School Street south down Shore Road, to the Firemen's Park, and from Shore Road west along the side of Firemen's Park to the residential district at the fire station.

Dennis's request would add an additional 40 yards to the business district on Shore Road. Neighboring restaurants Five-O Shore Road and Frills are currently part of the business district and Dennis is hopeful that her business could be included.

Both issues will be presented again at the next meeting, scheduled for April 2, to hear any public comment before the Board of Selectmen decides whether to put the items up for vote during the June election.

The Board of Selectmen also approved the plans for recognition plaques to be placed on Marginal Way, located to the left of the newly installed geology sign.

The two parallel plaques will be placed on a rock approximately 3 feet tall and each donor name will cost $10,000. The funds raised by the plaques will go toward maintaining Marginal Way.

Ben Hershenson, a member of the Marginal Way Preservation Fund, explained that it takes "many people and many public and private funds" to help ensure the future health and vitality of Marginal Way.

The vote for the plaques resulted in a 3-2 decision with selectmen Jarochym and Bob Winn opposed.

A public hearing to discuss the new public works facility will be held at the Dunaway Center at 6 p.m. March 28 to hear feedback from residents who wish to participate with the process before the location for the building is announced at an upcoming Board of Selectmen meeting.

http://bangordailynews.com/2013/03/22/news/portland/ogunquit-could-be-first-maine-municipality-to-ban-pesticides/ printed on March 25, 2013

BANGOR DAILY NEWS

# Island voters reject mosquito pesticide proposal

By Bill Trotter, BDN Staff
Posted March 20, 2013, at 2:43 p.m.

CRANBERRY ISLES, Maine — Residents of this five-island town off Mount Desert Island have resigned themselves to another possibly buggy summer.

Last year mosquitos came out in force on the islands, which have significant wetlands on them, prompting one seasonal resident to petition the town to take action. Not only were the mosquitos considered a nuisance, but there were concerns about mosquito-borne illnesses such as West Nile virus and eastern equine encephalitis.

Denise McCormick, Cranberry Isles' town clerk, said Wednesday that she could not recall how many people signed the petition but that the proposal was to raise $25,000 to hire a firm that would survey the islands for possible treatment sites. Wherever that firm might find standing water that was serving as mosquito nurseries, she said, it would apply a pesticide known as bacillus thuringiensis israelensis, or BTI, that would kill the mosquito larvae.

On Saturday, however, the idea was shot down at the annual town meeting. Lobstermen, who make up a sizeable portion of the islands' population of around 150, are wary of how the use of pesticides and resulting runoff might affect lobster in the surrounding coastal water and raised those concerns, McCormick said.

There have been cases in which pesticides are suspected of having killed lobsters in the ocean. A sharp decline since the 1990s in the lobster population in Long Island Sound off Connecticut has been linked to an application of pesticides in New York City. Across the Canadian border in New Brunswick, a salmon aquaculture company is facing charges after lobsters there were found dead a few years ago from a suspected pesticide application.

The vote on Saturday was 31 opposed to the mosquito pesticide application and six in favor of it, McCormick said.

In other town meeting business, voters approved an overall 2013 municipal budget of more than $2 million, which includes half a million dollars for education expenses for children in kindergarten through high school, according to the town clerk. Those education expenses include $100,000 in capital expenditures for the town's two elementary schools for new sprinkler systems, a new roof, and other improvements.

Other expenses approved by voters include authorizing the town to spend up to $220,000 for a new pumper truck for the fire department on Little Cranberry Island and up to $87,000 for a new public toilet by the municipal pier on Great Cranberry Island. Those two capital expenses are the main reason why the town's 2013 budget is about $250,000 higher than the 2012 municipal budget of $1,812,556, she said.

In elections, Charles Dunbar was elected to the board of selectmen, McCormick said. Dunbar is the first Bear Island resident to serve as a selectman since the town was founded in 1830, she said.

## Registry alerts applicators to pesticide-sensitive crops

**03/26/2013 10:31:55 PM**
**By Vicky Boyd**

DriftWatch, a voluntary online registry launched by Purdue University has grown to become a nationwide registry for high-value pesticide-sensitive crops.

The new non-profit corporation, FieldWatch Inc., of West Lafayette, Ind., has taken over responsibilities for the registry from Purdue, according to a news release.

The new corporation will be guided by a board of directors comprising both producers and applicators.

The registry allows farmers and applicators to identify, map and communicate where pesticide-sensitive crops are grown.

In addition to Indiana, growers in other Midwestern states as well as Colorado and Montana have used the tool.

Here's how it works.

Producers of pesticide-sensitive high-value crops, such as tomatoes, fruit trees, grapes and vegetables, register their fields online and provide contact information about their operation.

At the same time, pesticide applicators use the site to help determine whether sensitive crops are located in the area they will treat.

The goal is to create better awareness, communication and interaction between all parties.

During the transition, growers and applicators can still register at **www.driftwatch.org**.

Bloomberg

# Dow AgroSciences Wins Bid to Overturn Pesticide Proposals

By Andrew Zajac - Feb 21, 2013

Dow Agrosciences LLC and two other pesticide makers won a bid to overturn U.S. National Marine Fisheries Service proposals to protect salmon when an appeals court found the agency's decision "arbitrary and capricious."

The fisheries service recommendations to protect salmon from the pesticides chlorpyrifos, diazinon and malathion were based "on a selection of data, tests and standards that did not always appear logical, obvious or even rational," the appeals panel in Richmond, Virginia, ruled today, reversing a lower court and sending the proposals back to the fisheries service.

The fisheries office also failed to supply an economic reason to ban pesticides from buffer strips of land abutting salmon habitats, according to the ruling by Judge Paul Niemeyer, writing for a three-judge panel.

"By not addressing the economic feasibility of its proposed 'reasonable and prudent' alternative providing for one- size-fits all buffers, the Fisheries Service has made it impossible for us to review whether the recommendation satisfied the regulation and therefore was the product of reasoned decision-making," Niemeyer wrote.

The fisheries service, a unit of the National Oceanic and Atmospheric Administration, is reviewing the ruling, Fionna Matheson, a NOAA spokeswoman, said in an e-mail.

## Fish Threat

Stephen Mashuda, an attorney for Earthjustice, a San Francisco-based environmental advocacy group that joined the case on the government side, predicted that the fisheries service will be able to supply the evidence to back up its position the the pesticides pose a threat to salmon and related species, such as steelhead trout.

"We're still confident that the agency's ultimate conclusions about the pesticides will stand," Mashuda said. "These are three of the most toxic pesticides on the planet, to wildlife and to humans."

Garry Hamlin, a spokesman for Indianapolis-based Dow Agrosciences, said the company is pleased by the ruling.

Dow was joined in the case by Makhteshim Agan of North America Inc. and Cheminova Inc. U.S.A.

The case is Dow Agrosciences v. National Marine Fisheries, 11-cv-2337, U.S. Court of Appeals for the Fourth Circuit (Richmond, Virginia).

To contact the reporter on this story: Andrew Zajac in Washington at azajac@bloomberg.net

To contact the editor responsible for this story: Michael Hytha at mhytha@bloomberg.net

15 March 2013 Last updated at 11:56 ET

# Bee deaths: EU delays action on pesticides ban

**By Mark Kinver** Environment reporter, BBC News


A decline in bee numbers has been linked by the EU to use of some pesticides

**EU nations have been unable to reach agreement on proposals to ban the use of three pesticides that have been linked to the decline of bees.**

The European Commission had called for a two-year EU-wide moratorium, but a number of nations opposed the plans.

A recent report by the European Food Safety Agency (EFSA) concluded that the pesticides posed a "high acute risk" to pollinators, including honeybees.

The commission is expected to redraft its proposals ahead of another vote.

Member states were unable to reach a qualified majority in order for the proposals to be adopted.

The news of the stalemate has angered groups that had been campaigning in favour of the ban.

## Unknown consequences

A spokeswoman for Defra, the UK's environment department, said 14 out of the 27 EU nations - including the UK and Germany - had not supported the commission's proposals as they currently stood.


The commission proposed to ban the use of the chemicals on crops that attracted bees

"Bee health is extremely important but decisions must be based on sound scientific evidence and rushing this through could have serious unintended consequences both for bees and for food production," she added.

"We are currently finalising studies that will give us the evidence on which to base a proper decision. But as we do not have the evidence yet, it is impossible for us to vote either way."

Global web-based campaign group Avaaz condemned the UK's and Germany's decision to abstain, saying the governments had "caved in to the industry lobby".

"Today's vote flies in the face of science and public opinion and maintains the disastrous chemical armageddon on bees, which are critical for the future of our food," said Avaaz senior campaigner Iain Keith.

In a YouGov poll commissioned by the campaign network, 71% of almost 2,000 people questioned in the UK supported the commission's proposals to impose the moratorium on the insecticides.

Avaaz said that it, along with other groups, would be taking legal advice as to whether the outcome of the vote could be challenged in the courts.

The chemicals in question - imidacloprid, thiamethoxam and clothianindin - belong to a class of insecticides known as neonicotinoids.

The insecticides work by affecting the central nervous system of insects, causing paralysis and death.

**'Data shortcomings'**

A report published by **EFSA scientists in January identified a number of risks posed by the three insecticides**.

It assessed the possible threats to the pollinators from exposure to residues in pollen and nectar, dust and guttation fluid (some plants exude sap in the form of droplets).

However, it added that in some cases it was "unable to finalise the assessments due to shortcomings in the available data".

Bee expert Prof David Goulson from the University of Stirling said he was disappointed that the proposals had not been adopted.

"The panel of independent experts at EFSA spent six months studying all the evidence before concluding that current use of neonicotinoids posed an unacceptable risk to bees," he observed.

However, Prof Lin Field, head of crop protection at Rothamsted Research, said she was pleased with the outcome of the vote.

"In my view there is still is not enough clear evidence supporting a ban on neonicotinoids," she explained.

"Of course they can kill bees; they are insecticides. But whether they actually do this or whether sub-lethal effects occur and damage the colonies on any important scale has not been proven."

A number of EU countries, including Italy, have imposed a ban on the use of the chemicals at a national.

Arable farmer Mark Leggett echoed Prof Field's comments, adding: "We must be careful not to remove a product from the marketplace which is proving itself of massive worth in terms of controlling pests.

"We would be forced to go back and use old chemistry and less environmentally friendly alternatives… and if the aphids have resistance, we might not be able to control the aphids," he told the BBC's Farming Today programme.

In a statement, pesticide manufacturer Bayer CropScience said the failure to reach agreement showed that there was "no convincing argument against the continuing use of neonicotinoid-based products".

"Not only had the commission incorrectly based their rationale on recent EFSA reviews of these products, they had failed to make the appropriate impact assessments of any decisions they proposed on the broader interests of European stakeholders," it added.

Friends of the Earth's head of campaigns Andrew Pendleton said that there was "more than enough evidence that these chemicals are linked to bee decline to place immediate restrictions on their use".

"This is a cop-out by a significant number of European governments, including the UK - it means yet more dither and delay while our bee populations plummet," he added.

Chris Hartfield, head of bee health for the NFU, the UK's largest farming organisation, said: "We maintain that the proposed ban is not a proportionate response to the evidence we have available."

Dr Hartfield added that bee health in the EU was "challenged by a range of different factors".

"Since there is no evidence to pin the widespread declines of bee populations on any single factor, a proposed ban on neonicotinoids is unlikely to deliver any benefits that will halt or reverse these declines," he suggested.

Professor Jim Iley, executive director of science and education at the Royal Society of Chemistry told BBC News that gaps in data meant there was still a "degree of uncertainty" about the impact of the chemicals.

"If the cause is wrongly diagnosed, the precautionary action taken may be inappropriate," he said.

Following the vote, EU officials said that EU Health Commissioner Tonio Borg would "consider the next step".

**Related Stories**

- **EU targets pesticide to save bees**
- **Are pesticides harming UK bees? Listen**
- **Pesticides hit queen bee numbers**

BBC NEWS Science & Environment

# Neonicotinoid pesticides 'damage brains of bees'

By Rebecca Morelle Science reporter, BBC World Service

Scientists found that pesticides were affecting honey bees ability to learn and remember

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- EU delays action on pesticides ban
- EU targets pesticide to save bees
- Honey bees' genetic code unlocked

Commonly used pesticides are damaging honey bee brains, studies suggest.

Scientists have found that two types of chemicals called neonicotinoids and coumaphos are interfering with the insect's ability to learn and remember.

Experiments revealed that exposure was also lowering brain activity, especially when the two pesticides were used in combination.

The research is detailed in two papers in Nature Communications and the Journal of Experimental Biology.

But a company that makes the substances said laboratory-based studies did not always apply to bees in the wild.

And another report, published by the Defra's Food and Environment Research Agency (Fera), concluded that there was no link between bee health and exposure to neonicotinoids.

The government agency carried out a study looking at bumblebees living on the edges of fields treated with

the chemicals.

**Falling numbers**

Honey bees around the world are facing an uncertain future.

They have been hit with a host of diseases, losses of habitat, and in the US the mysterious Colony Collapse Disorder has caused numbers to plummet.

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# “Start Quote

> It would imply that the bees are able to forage less effectively”

End Quote Dr Sally Williamson Newcastle University

Now researchers are asking whether pesticides are also playing a role in their decline.

To investigate, scientists looked at two common pesticides: neonicotinoids, which are used to control pests on oil seed rape and other crops, and a group of organophosphate chemicals called coumaphos, which are used to kill the Varroa mite, a parasite that attacks the honey bee.

Neonicotinoids are used more commonly in Europe, while coumaphos are more often employed in the United States.

Work carried out by the University of Dundee, in Scotland, revealed that if the pesticides were applied directly to the brains of the pollinators, they caused a loss of brain activity.

Dr Christopher Connolly said: "We found neonicotinoids cause an immediate hyper-activation - so an epileptic type activity - this was proceeded by neuronal inactivation, where the brain goes quiet and cannot communicate any more. The same effects occur when we used organophosphates.

"And if we used them together, the effect was additive, so they added to the toxicity: the effect was greater when both were present."

Another series of laboratory-based experiments, carried out at Newcastle University, examined the behaviour of the bees.

The researchers there found that bees exposed to both pesticides were unable to learn and then remember floral smells associated with a sweet nectar reward - a skill that is essential for bees in search of food.

Dr Sally Williamson said: "It would imply that the bees are able to forage less effectively, they are less able to find and learn and remember and then communicate to their hive mates what the good sources of pollen and nectar are."

**'No threat'**

She said that companies that are manufacturing the pesticides should take these findings into account when considering the safety of the chemicals.

Continue reading the main story

# “Start Quote

> Decisions on the use of neonicotinoids must be based on sound scientific evidence”

End Quote Ian Boyd Defra

She explained: "At the moment, the initial tests for bee toxicity are giving the bees an acute dose and then watching them to see if they die.

"But because bees do these complex learning tasks, they are very social animals and they have a complex behavioural repertoire, they don't need to be killed outright in order not to be affected."

The European Commission recently called for a temporary moratorium on the use of neonicotinoids after a report by the European Food Safety Authority concluded that they posed a high acute risk to pollinators.

But 14 out of the 27 EU nations - including the UK and Germany - opposed the ban, and the proposal has now been delayed.

Ian Boyd, chief scientist at Defra, said: "Decisions on the use of neonicotinoids must be based on sound scientific evidence."

He said that the results of the Fera bumblebee study suggested that the extent of the impact might not be as high as some studies had suggested - and called for "further data based on more realistic field trials is required".

Dr Julian Little, communications and government affairs manager at Bayer Crop Science Limited, which makes some of the pesticides, said the findings of laboratory-based studies should not be automatically extrapolated to the field.

"If you take an insecticide and you give it directly to an insect, I can guarantee that you will have an effect - I am not at all surprised that this is what you will see," he explained.

"What is really important is seeing what happens in real situations - in real fields, in real bee colonies, in real bee hives, with real bee keepers."

# More on This Story

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The New York Times

March 15, 2013

# No Decision on Bee-Harming Pesticides in Europe

By DAVID JOLLY

A proposed measure to restrict the use of pesticides that have been implicated in bee die-offs around the world was left in limbo on Friday, after representatives from Britain and Germany, two of the largest members of the European Union, abstained from the voting in Brussels. The move left the committee without the needed qualified majority, which gives larger countries greater weight than smaller ones.

The proposal was based on a recent report from the European Food Safety Authority recommending that no pesticide containing chemicals known as neonicotinoids be used on crops that are attractive to honeybees, because of the risk that the insects would be poisoned.

Frédéric Vincent, a spokesman for the European Commission, said that for the moment officials in Brussels, including the European health commissioner, Tonio Borg, would “reflect” on what steps to take next, adding: “This isn’t the end of the story.”

Mr. Vincent said the commission could go back to member states on the committee with a revised proposal for a new vote. Alternatively, he said, the commission could ask the member states to hold another vote on the same proposal, and were there to be no qualified majority, the proposal could be enacted under the authority of the European Commission, the executive arm of the European Union.

The commission has that power, Mr. Vincent said, because “in that case the member states wouldn’t be making a decision.”

The commission has used that power in other contentious agricultural cases, like in March 2010, when it approved the cultivation of a genetically modified potato in the face of public opposition.

In all, 13 countries voted in favor of the proposal, including France, Spain, Italy and the Netherlands. Nine voted against, and five abstained, including Germany and Britain.

Bees of all kinds, which are essential to agriculture and ecosystems, have been dying by the millions over the last decade for reasons that are not fully understood. Mites and viruses are among the major culprits, but studies have also suggested that the neonicotinoid pesticides are contributing to the problem.

The makers of the pesticides, including the German giant Bayer CropScience and the big Swiss biochemical company Syngenta, claim that the available scientific evidence does not justify broad restrictions.

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**Subject:** Syngenta and Bayer CropScience Propose a Comprehensive Action Plan to Help Unlock EU Stalemate on Bee Health

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# Syngenta and Bayer CropScience Propose a Comprehensive Action Plan to Help Unlock EU Stalemate on Bee Health

## Syngenta News Release

**Syngenta and Bayer CropScience today proposed an action plan to help unlock the EU stalemate on bee health. This follows the failure of the European Commission to reach agreement with Member States on an appropriate response to EFSA's report on the theoretical risk to bee health from neonicotinoid pesticides.**

**John Atkin, Syngenta's Chief Operating Officer, said: "This comprehensive plan will bring valuable insights into the area of bee health, whereas a ban on neonicotinoids would simply close the door to understanding the problem. Banning these products would not save a single hive and it is time that everyone focused on addressing the real causes of declining bee populations. The plan is based on our confidence in the safety of our products and on our historical commitment to improving the environment for bees."**

**Dr. Rüdiger Scheitza, Member of the Board of Management of Bayer CropScience and Head of Strategy & Business Management, said: "Even though all the evidence points to various parasites and diseases being the true cause of poor bee health, we are keen to do everything in our power to give consumers confidence in our products. The significant lack of agreement between the European Commission and the Member States needs a bold plan so that farmers in Europe can continue to produce the high quality affordable food, in a way that promotes the health of bees and other pollinators. We believe that such a plan as this can be delivered."**

**The key features of the action plan are:**

**1. Significantly scale up the creation of pollen rich, flowering field margins across the EU to provide essential habitat and nutrition for bees.**

**2. Support for the establishment of a comprehensive field monitoring program for bee health including the detection of neonicotinoid crop protection products – particularly in maize, oilseed rape, sunflower and**

**cotton.**

**3. Mandatory implementation of strict measures to mitigate the exposure risk to bees; these are currently already recommended by the manufacturers and effectively applied by most farmers as good agricultural practice.**

**4. Investment in and implementation, at the earliest opportunity, of new technologies which further reduce dust emissions from the planting of seed treated with neonicotinoid crop protection products.**

**5. Further investment in the research and development of new solutions for the main factors impacting bee health, which include parasites and viruses, and establishment of area-wide long-term pilot studies which demonstrate their effectiveness.**

**In further detail, the key features of the action plan are:**

## Significantly scale up the provision of pollen rich flowering field margins across the EU to be sown alongside bee attractive crops treated with neonicotinoids to provide habitat and nutrition.

- **This would build on Syngenta's 10-year Operation Pollinator program which has demonstrated that these margins dramatically increase pollinator populations, including honeybees.**
- **This would address one of the main factors identified by the European Commission in the decline in bee health.**

## Support for the establishment of a comprehensive field monitoring program for bee health including the detection of crop protection chemicals

- **A comprehensive program, following the guidelines for surveillance projects by the EU Reference Laboratory for honey bee health, shall be established.**
- **The current monitoring work of the EU reference laboratories on bee health, supported by national bee institutes, should be reinforced and extended.**
- **Within this new scope the detection of chemicals from crop protection, particularly neonicotinoids, and veterinary products should be included.**

## Mandatory implementation of strict measures to mitigate the exposure risk to bees

- **High quality treatment of seed to take place only in certified production sites which participate in a Quality Assurance Scheme.**

- **Strict rules governing the use of treated seed, such as the mandatory use of deflectors in planting machinery, application only by professional and certified users, and improved information exchange between farmers and beekeepers.**
- **Bayer Crop Science recently developed “SweepAir”, a new air-cleaning technology for maize sowing equipment offering a significant improvement in comparison to standard technology; first field tests with the prototype indicate a dust reduction well above 95%.**

## Invest in and roll out new technologies which further reduce the dust emissions from the planting of seed treated with neonicotinoid crop protection chemicals

- **Bayer CropScience and Syngenta are both working on new solutions to further improve the coating of seeds treated with crop protection chemicals and the way they are planted to ensure that dust emissions are minimized.**
- **Some of these solutions are ready to be deployed and we commit to continuing our investment in the research and development of these risk mitigation measures.**

## Further invest in the research and development of new solutions for the main factors impacting bee health

- **The European Commission identifies disease and viruses such as Varroa destructor, American foulbrood, European foulbrood, Nosema spp., and honey bee viruses as the main cause of the decline in bee health.**
- **Bayer CropScience and Syngenta have both invested in the research and development of new solutions to these parasites, diseases and viruses and commit to stepping up our activities in this area.**
- **Bayer CropScience and Syngenta commit to supporting area-wide long-term pilot studies which demonstrate their effectiveness.**

theguardian

Damian Carrington
guardian.co.uk, Friday 22 March 2013 09.38 EDT

# US government sued over use of pesticides linked to bee harm

Beekeepers, conservation and food campaigners accuse Environmental Protection Agency of failing to protect the insects

Honeybees swarming on a comb in a beehive. A coalition of beekeepers, conservation and food campaigners is suing the US government over the use of neonicotinoids. Photograph: Rex Features

The US government is being sued by a coalition of beekeepers, conservation and food campaigners over pesticides linked to serious harm in bees.

The lawsuit accuses the Environmental Protection Agency (EPA) of failing to protect the insects – which pollinate three-quarters of all food crops – from nerve agents that it says should be suspended from use. Neonicotinoids, the world's most widely used insecticides, are also facing the prospect of suspension in the European Union, after the health commissioner pledged to press on with the proposed ban despite opposition from the UK and Germany.

"We have demonstrated time and time again over the last several years that the EPA needs to protect bees," said Peter Jenkins, an attorney at the Centre for Food Safety who is representing the coalition. "The agency has refused, so we've been compelled to sue."

"America's beekeepers cannot survive for long with the toxic environment EPA has supported," said Steve Ellis, a Minnesota and California beekeeper and one of the plaintiffs who filed the suit at the federal district court. "Bee-toxic pesticides in dozens of widely used products, on top of many other stresses our industry faces, are killing our bees."

The EPA declined to comment on the lawsuit, but said in a statement: "We are working aggressively to protect bees and other pollinators from pesticide risks through regulatory, voluntary and research programmes. Specifically, the EPA is accelerating the schedule for registration review of the neonicotinoid pesticides because of uncertainties about them and their potential effects on bees." However, even the accelerated review will not be completed before 2018.

The pesticides named in the lawsuits are clothianidin, manufactured by Bayer, and thiamethoxam, made by Syngenta. Neither company chose to comment on the lawsuit, but industry group Crop Life America (CLA) is representing some of the companies.

"The CLA fully supports and trusts the rigour of EPA's review process for crop protection products, including neonicotinoids," said Ray McAllister, senior director of regulatory affairs at CLA. "This class of product represents an important component of modern agriculture that helps farmers protect their crops. Neonicotinoids are thoroughly tested and monitored for potential risks to the environment and various beneficial species, including honeybees."

A series of high-profile scientific studies in the last year have increasingly linked neonicotinoids to harmful effects in bees, including huge losses in the number of queens produced, and big increases in "disappeared" bees that fail to return from foraging trips. Disease and habitat loss are also thought to be factors in the recent declines in populations of bees and other pollinators.

A proposal to suspend the use of three neonicotinoids across the EU ended in a hung vote on 15 March. But Tonio Borg, the European commissioner for health and consumer policy, said this week he would take the proposal to appeal. If member states maintained their positions, the insecticides would be suspended. "The health of our bees is of paramount importance," said Borg. "We have a duty to take proportionate yet decisive action to protect them wherever appropriate."

The lawsuit against the EPA argues that, via "conditional registrations", the regulator rushed the neonicotinoids into the market without sufficient examination and since that time has failed to take account of new information. "Pesticide manufacturers use conditional registrations to rush bee-toxic products to market, with little public oversight," said Paul Towers, at Pesticide Action Network, part of the coalition.

The action by the coalition, which also includes the Sierra Club and the Centre for Environmental Health, follows an emergency petition in March 2012 which demanded the EPA suspend the use of clothianidin but was not acted upon. Also issued this week was a report from the American Bird Conservancy, which said the "EPA risk assessments have greatly underestimated [the risk to birds], using scientifically unsound, outdated methodology."

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**GM crops and carbon emissions**

# Frankenfoods reduce global warming

Mar 4th 2013, 15:30 by J.P.

At a time when agricultural experts are getting hot under the collar about an Indian village whose claims to be smashing rice-growing records have been extolled here and debunked here, it is useful to have a cool global appraisal of the state of genetically-modified (GM) crops, traditionally seen as most likely source of a new green revolution or (alternatively) as a disaster in embryo. Each year the International Service for the Acquisition of Agri-Biotech Applications (ISAAA), a not-for-profit body, publishes estimates for the number of hectares under GM crops. See here to order the report. Its most recent report shows that, for the first time, developing countries are growing more hectares of GM crops than rich countries are—a remarkable uptake since the technology was only introduced two decades ago, and is often seen as suitable mainly for rich farmers.

According to ISAAA, 170m hectares of land are planted to GM crops round the world and 52% of them are in emerging markets. Almost half of that share are in five countries, China, India, South Africa, Brazil and Argentina. Brazil is the most important of these: its GM land area rose by more than a fifth in 2012 to 37m hectares, making it the fastest growing GM market in the world and second in size behind America. Rich countries are using more GM crops, too, but only slightly: they planted 1.6m hectares more than in 2011, up 3%. Developing countries planted 11% more (9m hectares). Of the 17m farmers who use such crops round the world, 15m are in emerging markets.

The report also logs the spread of so-called “stacked traits”, crops with two or more bio-engineered traits. These are planted on 44m hectares, more than a quarter of the total.

Many greens continue to be implacably opposed to GM crops, which they regard as environmentally harmful. This year’s ISAAA report tries to calculate the effects of GM crops on the environment. It says they saved the equivalent of 473m kilograms of pesticides in 2011 (because GM makes crops resistant to pests); saved 109m hectares of new land being ploughed up (GM crops are usually higher-yielding so less land is required for the same output) and reduced greenhouse-gas emissions by 23 billion kg of carbon dioxide equivalent.

GM crops in general need fewer field operations, such as tillage. Reducing tillage allows more residue to remain in the ground, sequestering more CO2 in the soil and reducing greenhouse gas emissions. Fewer field operations also means lower fuel consumption and less CO2.

Greens won’t believe these claims and will probably point out that ISAAA gets money from Monsanto and other GM companies. But that is not a good enough reason to dismiss them (and anyway ISAAA also gets money from governments and the UN). The underlying claim that GM crops reduce carbon emissions seems stong.

The New York Times

February 19, 2013

# When Mutant Mosquitoes Attack

By MAGGIE KOERTH-BAKER

It's no wonder that Goethe wrote "The Sorcerer's Apprentice" near the dawn of the industrial age. The poem, which most of us now learn from Mickey Mouse, tells the story of a young man who, left to his own devices, mimics his boss's spell for making brooms fetch water pails. Once the task is done, he doesn't know how to stop the thing, so he chops the broom in half, which only enables it to work double duty. The sorcerer eventually returns, fixing the mess his subordinate has made (his situation never got quite as out of hand as Mickey's). Lesson learned: Solutions to problems at hand can create new, sometimes unforeseeable, challenges in the future.

As scientists consider using genetically modified mosquitoes to combat deadly diseases in the developing world, Goethe's poem should serve as a warning. Scientists are aware that their interventions in the natural world will have unintended effects, and in order to behave ethically, these potential risks must be considered. Even something as innocuous as a mosquito net may carry a considerable downside.

A mosquito net is a simple piece of technology: it creates a protective barrier between sleeping humans and the disease-carrying mosquitoes that would otherwise feast on them during the night. Combined with antimalarial drugs and in-home spraying of pesticide, nets are responsible for a 25 percent drop in global malaria deaths since 2000. But in Kenya, Tanzania and other countries that use bed nets, scientists are beginning to see evidence of a new problem: mosquitoes might be adapting to the solution, finding workarounds.

We are the mosquitoes' food, Nora Haenn, an anthropologist at North Carolina State University, reminded me, and like most creatures, they feed where the food is. (Or in this case, *when* it is.) Mosquito nets work because the mosquitoes most responsible for transmitting malaria in sub-Saharan Africa feed at night. But now they're trying their luck earlier, and outdoors. In other cases, night-feeding species seem to be losing ground to more flexible competitors — these also carry malaria.

Researchers have yet to prove definitively that mosquitoes are adapting their behavior in response to nets, but Haenn brought up the possibility to make a point: By solving certain problems, we often create new ones. For Haenn, who is part of an interdisciplinary program at N.C. State aimed at inserting discussions about ethics and responsibility into the early stages of biotech research, the side effects of scientific meddling weigh heavily.

**There are many** different organizations experimenting with mosquitoes in an effort to eradicate malaria and dengue fever — Haenn's colleagues at N.C. State; a group at the University of California, Irvine; and Oxitec, a private company in England. Of the many ways to tinker with mosquito DNA, two strategies are promising.

One approach, focused on dengue, aims to reduce the mosquito population by making it difficult for them to breed. Fred Gould, an entomologist at N.C. State, has been involved in an effort to design mosquitoes that produce flightless females. Only female mosquitoes draw blood, which they must do in order to reproduce. If they can't get off the ground, it will become impossible for them to mate, and the subsequent generation will be smaller than it would have been otherwise.

The other approach, focused on malaria, won't get rid of the pesky things, but it will make them less deadly. There are different types of malaria, Anthony A. James, a professor of microbiology at the University of California, Irvine, told me, and they're host-specific. Mice can't catch human malaria, and vice versa. James takes the genes that help mice fend off human malaria and transfers them into mosquitoes. Theoretically these altered mosquitoes would destroy the disease in their own bodies instead of spreading it to humans. To make it work on a large scale, scientists would have to connect this gene to what James calls "a drive system" — some trait that makes the malaria-immune mosquitoes more likely to reproduce than their normal cousins. Should someone figure out how to do this with mosquito DNA, natural selection would do the rest.

It's a clever solution. But all solutions, whether as simple as a net or as complicated as splicing genes, come with risks. For instance, Aedes aegypti is the species primarily responsible for spreading dengue. It's present around the world, but outside North Africa, it's an invasive species. If scientists use flightless female modifications against A. aegypti and succeed in decreasing its presence in, say, Mexico City, then what will fill its ecological niche there? (What is its ecological niche anyway? One entomologist told me that we don't even have a great understanding of mosquitoes' place in our ecosystem, because we have focused our efforts on killing them rather than observing them.)

Even curing a disease poses risks, because in all likelihood it won't stay cured forever. If G.M. mosquitoes completely neutered the malaria parasite's threat, even in one part of the world, it would be an incredible success story. But what happens if the parasite adapts to circumvent the tools we've used to fight it? Today we know how to take precautions to prevent malaria transmissions and fight the disease with antimalarial drugs. But in the future, some version of malaria could surge through a population of humans without the cultural knowledge or pharmaceuticals necessary to defend themselves against it.

**This sort of** risk-taking is a hallmark of contemporary civilization. In 1986, the German sociologist Ulrich Beck coined the term "risk society" as a way of describing the shift in science and technology's relationship to risk over the past century. For most of human history, Beck argues, risks came from unknowable and uncontrollable forces — natural disasters, famine, disease. So we focused on mitigating those external risks. Today we have at least partial solutions to many natural risks — levees, industrial farming and antibiotics, say — but each solution contributes to new risks — more destructive floods, obesity and drug-resistant diseases — which then have to be managed with new solutions, which then present new risks.

"What this does though, in the public mind, is undermine people's belief in science," Haenn told me. "It creates skepticism." So science must change the way it engages with the world as it both reduces and creates risk.

Scientists must also consider their complex relationship with those they wish to help. Just because a community has a high incidence of dengue, it might not be keen to introduce G.M. mosquitoes to fight the disease — for any number of reasons. Dengue fever thrives in rural areas of developing nations, parts of the world where well-intentioned Western intervention has not always worked in the locals' favor. Even if there appears to be interest, researchers must understand the coercive effects of their mere presence. In rural Mexico, where some of this research is taking place with the assistance of the Mexican government, Haenn says there's unspoken pressure to accept any project that has federal backing. "People feel like if they reject any particular project, they'll be considered kind of noncooperative players and more goodies won't come their way," she told me. Besides, communities aren't monolithic. Deciding who has the authority to give the go-ahead to scientists who want to release genetically altered pests isn't easy.

These are not problems that scientists had to worry about in the past. In Beck's description of how risk societies work, the first round of scientific innovation — when science solves the problems imposed on us by nature — is accepted gratefully, even uncritically. We must now manage the risks that we have created, Haenn said, as well as those we continue to create.

*Maggie Koerth-Baker is science editor at BoingBoing.net and author of "Before the Lights Go Out," on the future of energy production and consumption.*

# *Multi-toxin biotech crops not silver bullets, scientists warn*

***University of Arizona, 04/01/2013***

The popular new strategy of planting genetically engineered crops that make two or more toxins to fend off insect pests rests on assumptions that don't always apply, University of Arizona researchers have discovered. Their study helps explain why one major pest is evolving resistance much faster than predicted and offers ideas for more sustainable pest control.

A strategy widely used to prevent pests from quickly adapting to crop-protecting toxins may fail in some cases unless better preventive actions are taken, suggests new research by University of Arizona entomologists published in the Proceedings of the National Academy of Sciences.

Corn and cotton have been genetically modified to produce pest-killing proteins from the bacterium *Bacillus thuringiensis*, or Bt for short. Compared with typical insecticide sprays, the Bt toxins produced by genetically engineered crops are much safer for people and the environment, explained Yves Carrière, a professor of entomology in the UA College of Agriculture and Life Sciences who led the study.

Although Bt crops have helped to reduce insecticide sprays, boost crop yields and increase farmer profits, their benefits will be short-lived if pests adapt rapidly, said Bruce Tabashnik, a co-author of the study and head of the UA department of entomology. "Our goal is to understand how insects evolve resistance so we can develop and implement more sustainable, environmentally friendly pest management," he said. Tabashnik and Carrière are both members of the UA's BIO5 Institute.

Bt crops were first grown widely in 1996, and several pests have already become resistant to plants that produce a single Bt toxin. To thwart further evolution of pest resistance to Bt crops, farmers have recently shifted to the "pyramid" strategy: each plant produces two or more toxins that kill the same pest. As reported in the study, the pyramid strategy has been adopted extensively, with two-toxin Bt cotton completely replacing one-toxin Bt cotton since 2011 in the U.S.

Most scientists agree that two-toxin plants will be more durable than one-toxin plants. The extent of the advantage of the pyramid strategy, however, rests on assumptions that are not always met, the study reports. Using lab experiments, computer simulations and analysis of published experimental data, the new results help explain why one major pest has started to become resistant faster than anticipated.

"The pyramid strategy has been touted mostly on the basis of simulation models," said Carrière. "We tested the underlying assumptions of the models in lab experiments with a major pest of corn and cotton. The results provide empirical data that can help to improve the models and make the crops more durable."

One critical assumption of the pyramid strategy is that the crops provide redundant killing, Carrière explained. "Redundant killing can be achieved by plants producing two toxins that act in different ways to kill the same pest," he said, "so, if an individual pest has resistance to one toxin, the other toxin will kill it."

In the real world, things are a bit more complicated, Carrière's team found out. Thierry Brévault, a visiting scientist from France, led the lab experiments at the UA. His home institution, the Center for Agricultural Research for Development, or CIRAD, is keenly interested in factors that could affect pest resistance to Bt crops in Africa.

"We obviously can't release resistant insects into the field, so we breed them in the lab and bring in the crop plants to do feeding experiments," Carrière said. For their experiments, the group collected cotton bollworm – also known as corn earworm or *Helicoverpa zea* –, a species of moth that is a major agricultural pest, and selected it for resistance against one of the Bt toxins, Cry1Ac.

As expected, the resistant caterpillars survived after munching on cotton plants producing only that toxin. The surprise came when Carrière's team put them on pyramided Bt cotton containing Cry2Ab in addition to Cry1Ac.

If the assumption of redundant killing is correct, caterpillars resistant to the first toxin should survive on one-toxin plants, but not on two-toxin plants, because the second toxin should kill them, Carrière explained.

"But on the two-toxin plants, the caterpillars selected for resistance to one toxin survived significantly better than caterpillars from a susceptible strain."

These findings show that the crucial assumption of redundant killing does not apply in this case and may also explain the reports indicating some field populations of cotton bollworm rapidly evolved resistance to both toxins.

Moreover, the team's analysis of published data from eight species of pests reveals that some degree of cross-resistance between Cry1 and Cry2 toxins occurred in 19 of 21 experiments. Contradicting the concept of redundant killing, cross-resistance means that selection with one toxin increases resistance to the other toxin.

According to the study's authors, even low levels of cross-resistance can reduce redundant killing and undermine the pyramid strategy. Carrière explained that this is especially problematic with cotton bollworm and some other pests that are not highly susceptible to Bt toxins to begin with.

The team found violations of other assumptions required for optimal success of the pyramid strategy. In particular, inheritance of resistance to plants producing only Bt toxin Cry1Ac was dominant, which is expected to reduce the ability of refuges to delay resistance.

Refuges consist of standard plants that do not make Bt toxins and thus allow survival of susceptible pests. Under ideal conditions, inheritance of resistance is not dominant and the susceptible pests emerging from refuges greatly outnumber the resistant pests. If so, the matings between two resistant pests needed to produce resistant offspring are unlikely. But if inheritance of resistance is dominant, as seen with cotton bollworm, matings between a resistant moth and a susceptible moth can produce resistant offspring, which hastens resistance.

According to Tabashnik, overly optimistic assumptions have led the EPA to greatly reduce requirements for planting refuges to slow evolution of pest resistance to two-toxin Bt crops.

The new results should come as a wakeup call to consider larger refuges to push resistance further into the future, Carrière pointed out. "Our simulations tell us that with 10 percent of acreage set aside for refuges, resistance evolves quite fast, but if you put 30 or 40 percent aside, you can substantially delay it."

"Our main message is to be more cautious, especially with a pest like the cotton bollworm," Carrière said. "We need more empirical data to refine our simulation models, optimize our strategies and really know how much refuge area is required. Meanwhile, let's not assume that the pyramid strategy is a silver bullet."