Pollinator Stewardship Council

# Pollinator News

Oct. 3, 2014

## Pictorial of abnormal bee mortality from Minnesota systemic pesticide exposure

The top picture was taken Sept. 23rd as Jeff Anderson was preparing to take honey off and cull dead and dying hives. This particular bee yard has more than the normal number of skips, but is fairly representative of 2014. He starts his bee yards with 9 pallets / 36 beehives.

The picture above was taken Sept. 24th part-way through pulling honey off a bee yard. They are working right to left, note the first pallet has only one hive still on it containing a queen and some bees, the other 3 have been removed as dead. There is quite a bit of honey in the supers. Jeff estimates the hives, including the ones pulled out as dead averaged close to 100 pounds of surplus honey. It takes a robust hive of bees to make honey; dead bees are not efficient collectors.

He always combines the hives on the pallets before leaving the bee yard. We took the picture above just before picking up the empty pallets on half of the bee yard. These two photos are from one half of the bee yard which started with 36 hives. The total number of hives alive on pallets when we finished was 10. USDA estimates an additional 30% will die during the winter. Honey bees are an excellent environmental indicator species. If something is amiss within their forage range, it will show up here.

# High Speed Photography Captures Honey bees

Filming for a documentary, Jeremy Dunbar captured various frame rates from 16,000 frames per second to 150,000 frames per second. Honey bees flap their wings up to 250 times a second. He used the Phantom v2511 camera which then creates slow motion upon playback. Check out the You Tube video to see the camera set-up it takes to photograph honey bees, and watch the intricacies of honey bees in flight.
http://youtu.be/IcU-i7j0uYs


# Biological Pesticides for Integrated Pest Management

Beekeepers work with farmers to increase their yield through pollination. Beekeepers work with farmers to ensure healthy honey bees go into a crop, and healthy honey bees leave that pollinated crop, so they can pollinate the next crop. The Pollinator Stewardship Council encourages peer-reviewed research of new solutions, new products to combat crop pests and pollinator pests and pathogens. Biological pesticides have their role in agriculture, often offering crop protection as well as pollinator protection.

Farmers continually ask beekeepers what products they can use to protect their crops from pests, and yet keep pollinators safe. Beekeepers stress a return to a complete Integrated Pest Management Program. In a recent discussion about available options to growers for pest control we spoke with and researched "biological pesticides." (AKA biocides, biopesticides, biologicals) While, "biologicals" may be of/from nature, a formulation drawn from naturally occurring products still must be applied per the guidelines for use.

The European Union defines biopesticides as "a form of pesticide based on micro-organisms or natural products." The US EPA states biopesticides "include naturally occurring substances that control pests (biochemical pesticides), microorganisms that control pests (microbial pesticides), and pesticidal substances produced by plants containing a genetic material (plant-incorporated protectants) or PIPs." Injecting a plant with a gene that silences a gene in a pest is a "plant incorporated protectant." This RNAi technology is not extensively researched. Concerns with RNAi technology were voiced succinctly by the EPA's Scientific Advisory Panel (http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2013-0485-0011)). While RNAi technology is listed as a "plant-incorporated protectant" the Scientific Advisory Panel clearly stated, based on current research:

*"RNAi has necessary functions within cells that are important to growth, development and tissue homeostasis. Oversaturation of RNAi machinery as a result of introduction of environmental dsRNA could disrupt regulation of gene expression and normal cell function (Dillin 2003, Katoch et al. 2013, Lundgren and Duan 2013). Saturation could also lead to reduced defenses against viral infection (Dillin 2003). Exposure to RNAi may also stimulate immune response. This has been observed in mammals (see Lundgren and Duan 2013), and could be a factor for observed gene silencing in some insect studies (Terenius et al. 2011); however, how immune stimulation by RNAi may affect nontarget organisms is not known."*

*"Without further information, it is not unreasonable to assume that some kind of related effect could occur in nontarget organisms; however, at this point the actual biological impacts are not known."*

It is not just the dose of a control agent, it is also the application process as well, and then what happens to the "dose" as it translocates throughout the plant, is broken down, and the coating on the seed dissipates into the soil, or is caught up on the wind, and the plant product is eaten by other non-target species. "*Bacillus thuringiensis*, a bacterial disease of Lepidoptera, Coleoptera and Diptera is a well known insecticide." "The use of Bt Toxin is particularly controversial." One study found changes to liver and kidney function in mammals. Another study found harm to Monarchs from drifting Bt laced pollen onto milkweed leaves. We need to understand the differences, the technology, and peer-reviewed scientific analysis before any action is taken upon our food, the fields that grow our food, and the pollinators that pollinate our food.

Biopesticides are naturally occurring substances, such as microbes, bacteria, plant extracts, fatty acids or pheromones. When used in Integrated Pest Management systems, biopesticides' efficacy can be equal to or better than conventional products, especially for crops like fruits, vegetables, nuts and flowers. "Every plant species has developed a built-in unique chemical complex structure that protects it from pests. The plant kingdom offers a diverse array of complex chemical structures and almost every imaginable biological activity. These biodegradable, economical and renewable alternatives are used especially under organic farming systems."

In the United States, producers are becoming more familiar with the science behind biopesticides. Steady advances were made in the 1990s and 2000s in microbial and biochemical research and in formulation technology. So today's biopesticides are much improved over earlier biopesticides. The advantages offered by the use of biopesticides are spurring increased usage in the areas of landscaping, home gardening, and farming.

A bioinsecticide based on a bacterial strain, and a fungicide created from the extract of giant knotweed are examples of new crop protectants available to farmers. As pests become more tolerant of synthetic chemicals, alternatives will come to the forefront to protect crops. Small companies often take the lead with new ideas, and offer alternative solutions. With any product: conventional, natural, organic, biological, synthetic, etc. understand the composition, mode of action, hazards, and the directions for use. Most importantly, before using any product on a blooming crop, talk with beekeepers.

Biologicals are an alternative to some problematic conventional pesticides. Growers who incorporate biopesticides into their programs do so because they see a tangible return on investment. Biopesticides are:

- efficacious
- effective in managing pesticide resistance
- leave minimal crop residues; good for export markets
- permit harvest flexibility
- maintain beneficial insect and predatory mite populations
- ensure worker safety
- mostly non-toxic to beneficial insects such as bees, and
- promote environmental safety.

As beekeepers talk with farmers and orchard managers about protecting their bees while they are pollinating their crop, America's fruit, nuts, and vegetables, due diligence is key to knowing the best solution for the crop and the bees. The entire label of any pesticide, chemical or biological, must be read. If a product is toxic to bees do not apply it when the bees are pollinating the blooming crop. If a pest has occurred during the bloom, talk to the beekeeper you hired to pollinate your crop. Together you can determine a short-residual pest control product, applying it when the bees will not be at risk. We all have to learn about new products, all options, and different methods, in order to care for our bees, and care for our farms in order to continue to be able to grow diverse, nutritious food.

**Organic Pesticides and Biopesticides**
http://www.clemson.edu/extension/hgic/pests/pesticide/hgic2756.html

**Pros and Cons of Pesticides**
http://www2.mcdaniel.edu/Biology/eh01/pesticides/pro,consof_pesticides.html

**Alternatives to pesticides**
http://www2.mcdaniel.edu/Biology/eh01/pesticides/alternatives.html

**Biopesticides**
http://en.wikipedia.org/wiki/Biopesticide

**Grandevo® Eurofin bee study**
http://www.marronebioinnovations.com/lightray/site/wp-content/uploads/2013/05/Grandevo-Eurofin-bee-study-magazine-article-Digital-edition-03-11-13-.pdf

**Thymol**
http://en.wikipedia.org/wiki/Thymol

**NPIC- Integrated Pest Management**
http://npic.orst.edu/pest/ipm.html

**What are biopesticides?**
http://www.epa.gov/pesticides/biopesticides/whatarebiopesticides.htm

**My agriculture information bank**
http://agriinfo.in/default.aspx?page=topic&superid=3&topicid=1951

**Calotropis procera and Annona squamosal: Potential Alternatives to Chemical Pesticides**
http://www.sciencedomain.org/abstract.php?iid=191&id=5&aid=952#.VCMBhBYXM9I

**Transgenic pollen harms monarch larvae**
http://www.nature.com/nature/journal/v399/n6733/abs/399214a0.html
**A three generation study with genetically modified BT corn in rats: Biochemical and histopathological investigation**

http://www.ncbi.nlm.nih.gov/pubmed/18191319

**Pesticides vs. biological control**
http://www.virtual-explorations.org/Florida_insects/biological_control.htm

# Research

**Pesticide residues in honeybees, honey and bee pollen by LC–MS/MS screening: Reported death incidents in honeybees** http://www.ncbi.nlm.nih.gov/pubmed/24747255

Bt corn treatments regardless of soil insecticide application. In the current study, the use of tefluthrin on Bt corn did not significantly affect crop damage or yield, and tefluthrin may travel off-site in runoff water and sediment."

**For other news stories, videos, and research, visit our website www.pollinatorstewardship.org**

photocredits: Jeff Anderson; Jeremy Dunbar; www.envirotechgreenhouse.com


# We are beekeepers, helping beekeepers

If your State or local beekeeping association has pending legislation, or you wish to show beekeeper support of state and local beekeeping issues, contact us. We may be able to assist your state and local beekeeping group with getting your message directly to your local and state decision-makers.
http://pollinatorstewardship.org/?page_id=2538

**Pollinator Stewardship Council**
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**We are also on**

https://www.facebook.com/pages/Pollinator-Stewardship-Council/211500982339 34

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**Beekeepers Working for Beekeepers**
The Board and Program Director are all beekeepers. We work to:

**Raise awareness about the adverse impact of pesticides on pollinators critical to the supply of food and the ecosystem**.

- presentations to local, state, regional, and national beekeeping / agricultural groups
- bi-monthly newsletter featuring current research and issues about pesticides and pollinators
- collaborations with local, state, and national groups on projects
- connect beekeepers with journalists for local, state, and national stories in print, radio, television, and digital media
- collaborate and support local, state, and national legislative efforts to facilitate actions to protect pollinators
- lend our technology to assist a local group to generate action letters for their local beekeeping related issue
- maintain a website with local, state, and national links, current research, and a plethora of information on pollinators and pesticides
- maintain a Facebook page to educate and communicate with fellow beekeepers and "bee supporters" about the pollinators in our communities

**Provide advocacy, guidance, and tools to document the detrimental effect of pesticides on pollinators.**

- collect bee kill reports; sharing the data through our website; assisting beekeepers in reporting bee kills to U.S. EPA
- presentations to local, state, regional, and national beekeeping / agricultural groups about bee kills: reporting, documenting, resolving
- develop collaborative project to track bee hives in agriculture to gather data on the real-world environment of managed honey bees in crop pollination

**Affect regulatory processes of pesticide risk assessment, label, and enforcement.**

Board members and staff serve on local, state, and national committees, workgroups, and coalitions, including the:

- Pollinator Protection Workgroup of EPA, Pesticide Program Dialogue Committee of EPA, Honey Bee Health Coalition, National Honey Bee Advisory Board, American Honey Producers Association, American Beekeeping Federation, and, are members of their respective state and local beekeeping associations.