From: Ackroeger@aol.com [mailto:Ackroeger@aol.com]
Sent: Thursday, May 01, 2014 8:00 AM
To: Regimbal, Gregg (MDA)
Subject: MDA scoping of neonicotinoid review

Gregg,

My comments on MDA's scoping of neonicotinoid.

Thank you.

Copied below and attached

Amelia Kroeger
10720 Toledo Court
Bloomington MN 55437
952-884-3406 or email ackroeger@aol.com

1 May 2014

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

Dear Mr. Regimbal,

RE: MDA scoping of neonicotinoid review

I am a Minnesotan greatly concerned over bee colony collapse and the rapidly dwindling number of all pollinators.

I applaud the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Minnesota has ranked in the top 5 honey-producing states in the nation. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through commonsense action to protect bees from neonicotinoids.

In addition to the proposed scope of MDA's review of neonicotinoids, I recommend the following additions:

1. MDA should investigate options for reducing and restricting the use of neonicotinoid insecticides—and, hence, the risk of pollinator exposure. Minnesota policy-makers and the public would benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.
2. MDA should take into consideration the growing body of evidence indicating that neonicotinoid seed treatments do not consistently increase yields or profitability[i][i] when used on major Minnesota crops like corn, soy, canola, wheat, and dry beans. A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered

farmers any economic benefits."[ii][ii] A 2006 study of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the grower."[iii][iii] Peer-reviewed research on yield impacts of neonicotinoids on Minnesota's major crops must be included in MDA's assessment.

3. MDA should enhance applicator education and enforcement of all neonicotinoid insecticide labels. In particular, per acre use limits should be strictly enforced.

MDA's review of neonicotinoids comes at an advantageous time, as new laws to protect pollinators move through the legislature and growing numbers of Minnesotans call for even stronger solutions to bee declines. MDA's engagement on this issue is laudable and reflects the agency's bold commitment to pollinator protection. MDA's review shouldn't stop with an assessment of current impact of neonicotinoids, but instead, work to minimize the usage and effects of neonicotinoids in order to protect our state's agricultural system and safeguard pollinators.

Sincerely,

Amelia Kroeger

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[i][i] For a review of 19 independent studies that considered the efficacy and yield benefits of neonicotinoid insecticides, see "Heavy Costs: Weighing the Value of Neonicotinoid Insecticides in Agriculture." Center for Food Safety, 2014. http://www.centerforfoodsafety.org/issues/304/pollinators-and-pesticides/reports/2999/heavy-costs-weighing-the-value-of-neonicotinoid-insecticides-in-agriculture#

[ii][ii] Petzold-Maxwell, JL, LJ Meinke, ME Gray, RE Estes, and AJ Gassmann. 2013. Effect of Bt maize and soil insecticides on yield, injury, and rootworm survival: implications for resistance management. *Journal of Economic Entomology*, 106(5): 1941- 1951.

[iii][iii] McCornack, BP and DW Ragsdale. 2006. Efficacy of thiamethoxam to suppress soybean aphid populations in Minnesota soybean. *Crop Management*, 5(1).

From: Barbara Mager [mailto:bjmager@stkate.edu]
Sent: Wednesday, April 30, 2014 10:16 PM
To: Regimbal, Gregg (MDA)
Cc: Rick Hansen; Janet Dahlem
Subject: Scoping review of neonicotinoids

Hi Greg,

I just want to weigh in on the valuable work that the MDA is doing in promoting better understanding and awareness of the use of neonicotinoids. This issue is of great importance to the health and well being of our pollinator populations and to the people of Minnesota. This issue is, of course, important on a global scale yet, I acknowledge that much of the good work that begins locally can have an effect on a much larger scale.

I am particularly interested in effective labeling for plants sold to the public, at garden centers, hardware stores, grocery stores and the like. I would like to see what types of chemicals, especially neonicotinoids, are accompanying my bedding plants and vegetable seedlings.

I appreciate the work that is being done in the state legislature regarding pollinator populations however, I don't think that the current legislation goes far enough. I hope that the results of this review provide evidence to support stronger legislation in the next session.

Thank you,
Barb Mager
440 Thompson Ave W.
West St. Paul, MN 55118

651-308-8414

Bayer CropScience

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
Saint Paul, MN 55155-2538

May 2, 2014

Bayer CropScience, LP
2 T.W. Alexander Dr.
RTP, NC 27709

RE: Scoping Document Special Review of Neonicotinoid Insecticides

Dear Mr. Regimbal,

Bayer CropScience welcomes the opportunity to provide comments to the recent draft scoping document by the Minnesota Department of Agriculture (MDA) to review uses of neonicotinoid insecticides as they relate to pollinator health. Bayer recognizes the importance of honey bees to agriculture and is fully committed to pollinator protection and to sustainable agricultural practices, including the use of innovative crop protection technologies. We support comprehensive research, meaningful stewardship and collaborative measures that reduce potential exposures to protect bees and other pollinators.

All pesticides are subject to periodic reevaluation under the federal Food Quality Protection Act, which ensures that registered products are continuously evaluated to meet the highest standards of safety to protect human health and the environment. In the case of neonicotinoid insecticides, this reevaluation process is not only well underway, but has been accelerated to help answer potential questions regarding honey bee health. A large body of data will be available as part of the registration review through the U.S. Environmental Protection Agency's (EPA) data-call-in process that will help answer questions being raised in the scoping document. Since 2012, the EPA and other agencies have been working collaboratively to implement a new quantitative, multi-tiered framework for evaluating pollinator risk.

We understand the MDA review is not intended to be redundant to the ongoing reevaluation process described above, but will include market use, stewardship and outreach efforts provided by registrants to further protect pollinators. While we will cooperate with this initiative, we urge the MDA to consider the substantial information that has been developed already regarding neonicotinoid and pollinator risk assessment. It is also important to consider the unintended consequences of limiting the use of new technologies, especially when alternative products may be unavailable, less effective, or pose greater potential risks to human safety or the environment.

Neonicotinoid insecticides have been widely adopted by farmers because of their effectiveness against destructive pests and their relatively favorable environmental profile when compared to the older products they replaced. The use of these seed-applied insecticides has enabled farmers to significantly improve the performance of their business operations. Working with leading economists, the crop protection industry is preparing a comprehensive assessment of the benefits associated with

neonicotinoid uses in North America. This information will be made available and should provide important context to the MDA review process.

IPM Practices

The scoping document raises questions as to whether the widespread adoption of neonicotinoid seed treatments has caused a shift away from integrated pest management (IPM) practices. The document suggests the use of seed treatments in the absence of field monitoring (to determine treatment thresholds) may lead to impacts on beneficial insects, pest resistance, resurgence of secondary pests, and higher costs. The EPA defines IPM as an "effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices."[1] Applying this definition to modern seed treatments helps to better appreciate distinctions between common IPM indices and current agronomic considerations:

- **Thresholds** – Scouting is impractical for most soil pests and seedlings are vulnerable to early season feeding damage, making rescue treatments difficult, if not impossible
- **Beneficials** – Seed treatments are generally less disruptive to beneficial insects than potentially are most foliar sprays, helping to preserve beneficial insect populations
- **Resistance** – Despite widespread use on multiple crops, there is little evidence of pest resistance, particularly from current seed treatment uses
- **Secondary Pests** – Secondary pests populations have been minimized with neonicotinoid uses, which have helped suppress secondary spread of insect-transmitted viruses in various crops
- **Costs** – The use of neonicotinoid seed treatments has helped farmers increase productivity and improve cost-competitiveness, especially when compared to available alternatives

For the very same reason that seed treatments contain a standard fungicide to protect against disease, seed-applied insecticides are the most economical and effective way to manage early season insect pests. Importantly, there are few suitable alternative options that can help farmers manage the destructive impact of early season corn pests.

Assessing Pollinator Risk

Most scientists and bee experts agree that declining bee health is a result of multiple factors, including parasites, diseases, inadequate nutrition, weather and hive management practices. Large multi-factorial studies conducted in Europe and North America show that poor bee health correlates well with presence of Varroa mite and bee diseases, but not with exposure to agrochemicals. Comprehensive reviews of studies and databases comprising 15 years of research were recently published by a diverse group of researchers and directly challenge claims against neonicotinoids as a significant cause of colony decline.[2,3,4,5,6,7,8,9] These review references are attached, but it is informative to note two examples which challenge unsubstantiated claims against neonicotinoids as a cause of honey bee decline:

- In its recent 92-page report, the Australian Pesticides and Veterinary Medicines Authority examined the impact of that country's extensive use of neonicotinoids, concluding "the introduction of the neonicotinoids has led to an overall reduction in the risks to the agricultural environment from the application of insecticides" and noted "Australian honeybee populations are not in decline, despite the increased use of this group of insecticides in agriculture and horticulture since the mid-1990s."[8]

- A review by Fairbrother et al. (2014), criticized the overreliance of laboratory studies in evaluating risk, noting "Assessing risks only under worst-case conditions with individual honeybees, divorced from properties provided by colony interactions, serves only to understand potential mechanisms of action of different chemicals but not their actual risks." When considering the extensive body of existing research, the authors concluded "it is not reasonable, therefore, to conclude that crop-applied pesticides in general, or neonicotinoids in particular, are a major risk factor for honeybee colonies."[9]

The MDA review will evaluate potential direct and indirect effects of neonicotinoid uses through various routes of exposure. Exposures from foliar applications are mitigated by the label use instructions and the scoping document acknowledges that the risk from foliar applications of neonicotinoids would be similar to those of other chemical classes. Regarding systemic exposures, field studies have shown that residues translocated to pollen and nectar (via phloem) are far lower than those found in the foliage (via xylem) and usually well below levels of concern.[10,11] Although surface water and guttation droplets may be other ways in which bees could be exposed, the evidence does not support these as significant routes of exposure.[12,13]

Exposures to toxic levels of neonicotinoids to foraging bees may potentially occur if the treated seed coating is mechanically abraded during the planting process and released in the form of dust. Such high-exposure instances are remarkably rare, especially considering the many millions of acres that are planted each year, and the effects are usually transient. Although any loss of bees associated with agricultural production is of some concern, it is important to remember that these incidents are unrelated to the decline in the general health of honey bee colonies and high annual colony loss rates that many beekeepers have been experiencing in recent years.

Stewardship

Bayer is firmly committed to meaningful stewardship practices that support the use of critical crop protection tools required by farmers, while minimizing potential harmful exposures to honey bee colonies through innovative technological advancements and wide stakeholder communications. One of the most effective ways to prevent pesticide-related bee loss is through better communication between the farmer and the beekeeper. Bayer is working with these and other stakeholders to educate, communicate, and help implement best management practices for seed treatment applications and provide additional safeguards to pollinators. Knowing where beehives are located would greatly facilitate the effectiveness of these efforts.

As part of our commitment to pollinator protection, Bayer has developed a new seed application technology, which is designed to reduce potential dust exposure to honey bees during corn seed planting, while offering improved handling efficiencies to farmers. This new Fluency Agent has been shown to dramatically reduce potential dust exposure when compared to the current industry standard lubricants and will be launched in North America, beginning in 2014.

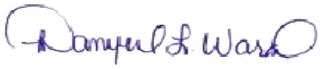
Extensive research evaluating the potential impact of neonicotinoids on honey bee health has produced no evidence that establishes a long-term causative effect on bee colonies. For example, several field studies have recently been conducted that followed the fate of the test colonies until the following Spring, and all report no reduction in overwintering success in comparison to control colonies.[14,15,16] Despite these results, claims of colony collapse or severe bee losses continue to be reported – but are rarely corroborated with verifiable hive health assessments. Until a systematic means of tracking commercial colony health is established, risk decisions may be tempered by anecdotal or incomplete information. Without a better understanding of actual colony metrics, it is difficult to measure the success of potential mitigation activities. A focus on neonicotinoid uses in the absence of any meaningful information about colony health statistics in Minnesota seems at odds with the stated purpose of this investigation.

Summary

Neonicotinoid insecticides represent an important advancement in agricultural technology that has helped American farmers increase productivity and improve cost-competitiveness. These products provide clear performance and environmental advantages over the older chemistries they replaced. Bayer strongly endorses ongoing research and meaningful stewardship measures, including the adoption of best management practices, to reduce potential exposures of crop protection products to bees. Although protecting honey bees from the unintended exposures to pesticides is a commitment shared by all agricultural stakeholders, this will have little practical consequence until we address the much broader and more significant threats to colony health.

If you have any questions, do not hesitate to contact me at (919) 549-2303 or danyel.ward@bayer.com.

Best Regards,



Danyel L. Ward
State Registration Manager
Bayer CropScience LP

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Subject: NEONIC PESTICIDE SPECIAL REVIEW
Date: Mon, 28 Apr 2014 09:07:02 -0500
From: chris <ccsc1988@comcast.net>
To: rajinder.mann@state.mn.us

I am a Minnesota taxpayer and voter. Although I am not a scientist, I am writing you today as a beekeeper who is concerned about what is happening to our pollinators. I am really hoping that the scope of the review will be thorough enough to come to some well founded conclusions as to what exactly is going on regarding the negative unintended consequences of using neonicotinoids. We need serious ways to prevent these consequences. I am especially concerned as to the impact on all pollinators from those in the wild to honey bee colonies maintained by beekeepers. Until we get clear answers that lead to best practices that protect pollinators, using neonics amounts to playing with fire. The review needs to consider if the continued use of neonics is appropriate given all of its impacts.

Thank you for your time and consideration,

Chris Cowen
1373 Breda Avenue
Saint Paul, MN 55108

From:	Diane Hilscher
To:	Regimbal, Gregg (MDA)
Subject:	MDA scoping of neonicotinoid review
Date:	Friday, May 02, 2014 9:36:40 AM

Dear Mr. Regimbal,

I work as a sustainable landscape architect and am writing to urge support of two bee-related bills making their way through the legislature: SF 2695 and SF 2785.

Bees and other pollinators are in trouble, with beekeepers reporting annual losses of about 30% since 2006. This last winter was extremely cold (and long) and friends who are beekeepers have lost over half their hives.

Last year overall brought unprecedented losses of 40-70%. While pesticides are not the only challenge bees face, science increasingly points to neonicotinoids ("neonics") as a key factor in declining populations.

I regularly advise my clients to purchase plants from high-quality nurseries such as Bachman's, Gerten's and those specialized in native plants with local genotypes who either grow their own or require their suppliers to declare they do not use neonics.

Where I live in the Wynstone neighborhood in West Lakeland Township, we have very few bees and butterflies in the past two years in our gardens, on our apple trees and in the prairie savanna compared to the previous 14 we have lived here. It is a very deep concern. Scary really. We've had to hand pollinate our raspberries, veggie plants and the apples. This is what's being done to crops in China. We MUST address this issue!

As you know, honeybees are a critical component of our food and farming system. They are responsible for pollinating about a third of our food, with the value of that service estimated at over $19 billion nationally.

I urge you to support pollinator protection and vote for SF 2695 and SF 2785.

The first — SF 2695 — just passed through the House and will be up for a Senate vote very soon. This bill would define neonicotinoids as "pollinator lethal insecticides" and bar nurseries from labeling any plants pre-treated with these insecticides as beneficial to pollinators.

Additionally, please vote to pass the pollinator section of Omnibus appropriations bill, SF 2785. This would establish an emergency team to respond to suspected pesticide kills. It would also compensate beekeepers facing serious hive losses due to pesticide exposure from the pesticide regulatory fund — a fund generated from fees that pesticide companies pay to register their products in the state.

I applaud the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Historically, Minnesota has ranked in the top five honey-producing states in the nation. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through common-sense action to protect bees from neonicotinoids.

In addition to the proposed scope of MDA's review of neonicotinoids, I recommend the following additions:

1. As part of a review of neonicotinoids, MDA should investigate options for reducing and restricting the use of neonicotinoid insecticides—and, hence, the risk of pollinator exposure. Minnesota policy-makers and the public would benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.

Strategies for reducing neonicotinoid use may include both voluntary steps (like BMP's, or increasing availability of untreated seeds and plants for farmers and gardeners) and regulatory action (tracking neonicotinoid seed treatments, or classifying neonicotinoids as restricted use pesticides). The review should include MDA's perspective on the opportunities and obstacles associated with various approaches to reducing the use of neonicotinoids.

2. In assessing the benefits of neonicotinoid use in Minnesota agriculture, MDA should take into consideration the growing body of evidence indicating that neonicotinoid seed treatments do not consistently increase yields or profitability when used on major Minnesota crops like corn, soy, canola, wheat, and dry beans. A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered farmers any economic benefits." A 2006 study of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the grower." Peer-reviewed research on yield impacts of neonicotinoids on Minnesota's major crops must be included in MDA's assessment.

The Minnesota Department of Agriculture's review of neonicotinoids comes at an excellent time, as new laws to protect pollinators move through the legislature and growing numbers of Minnesotans call for even stronger solutions to bee declines. MDA's engagement on this issue is laudable and reflects the agency's bold commitment to pollinator protection. MDA's review shouldn't stop with an assessment of current impact of neonicotinoids, but instead, work to minimize the usage and effects of neonicotinoids in order to protect our state's agricultural system and safeguard pollinators.

Sincerely,

Diane Hilscher
910 Oakgreen Ave. N
Stillwater, MN 55082
651-436-6238

From: Golden Ridge Honey
To: Regimbal, Gregg (MDA)
Subject: MDA scoping of neonicotinoid review
Date: Friday, May 02, 2014 10:17:36 AM
Attachments: sample comments MDA neonic review.pdf

I am sending you these comments for the open comment period in regard to the review of the neonicotinoids.

Manley Bigalk
23226 20th St.
Cresco, Ia. 52136 563-547-4222

June 2, 2014

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

Dear Mr. Regimbal,

RE: MDA scoping of neonicotinoid review

My name is Manley Bigalk, commercial beekeeper and farmer for 51 years. I am located on the Iowa-Minnesota border with several yards in Minnesota. I am a stakeholder in the Corn Dust Research Consortium (CDRC), representing the American Beekeeping Federation, which is entering its' second year of corn dust research. Two years ago at corn planting time we sustained our first honeybee kill. It occurred during a very compacted corn planting period. We had dead bees in front and on the bottom board of every single hive in every bee yard (23) in a two and half county area. The seed corn dust has been documented (CDRC 2013 Research) to contaminate blooming plants and trees in sizable areas around corn planting activity. Our concern also extends to the residual neonics in the soil that will become systemic with other plant life in following years. Research is showing very negative effects on honeybee health due to the huge amount of these materials being applied. I sincerely believe all pollinator health is being compromised by the overuse of these seed treatment materials.

I do applaud the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Historically, Minnesota has ranked in the top 5 honey-producing states in the nation. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through common-sense action to protect bees from neonicotinoids.

In addition to the proposed scope of MDA's review of neonicotinoids, I recommend the following additions:

1. As part of a review of neonicotinoids, MDA should investigate options for **reducing and restricting the use of neonicotinoid insecticides**—and, hence, the risk of pollinator

exposure. Minnesota policy-makers and the public would benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.

Strategies for reducing neonicotinoid use may include both voluntary steps (like BMP's, or increasing availability of untreated seeds and plants for farmers and gardeners) and regulatory action (tracking neonicotinoid seed treatments, or classifying neonicotinoids as restricted use pesticides). The review should include MDA's perspective on the opportunities and obstacles associated with various approaches to reducing the use of neonicotinoids.

2. In assessing the benefits of neonicotinoid use in Minnesota agriculture, MDA should take into consideration the growing body of scientific research indicating that neonicotinoid seed treatments on corn, soy, canola, wheat, and dry beans **do not consistently increase yields or profitability**.[i] A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered farmers any economic benefits."[ii] A 2006 study of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the grower."[iii] Peer-reviewed research on yield impacts of neonicotinoids on Minnesota's major crops must be included in MDA's assessment.

The Minnesota Department of Agriculture's review of neonicotinoids comes at an excellent time, as new laws to protect pollinators move through the legislature and growing numbers of Minnesotans call for even stronger solutions to bee declines. MDA's engagement on this issue is laudable and reflects the agency's bold commitment to pollinator protection. MDA's engagement shouldn't stop with an assessment of current impact of neonicotinoids, but instead, work to minimize the usage and effects of neonicotinoids in order to protect our state's agricultural system and safeguard pollinators.

Sincerely,
Manley Bigalk
Golden Ridge Honey Farm, Inc.
23226 20th St.
Cresco, IA 52136

[i] For a review of 19 independent studies that considered the efficacy and yield benefits of neonicotinoid insecticides, see "Heavy Costs: Weighing the Value of Neonicotinoid Insecticides in Agriculture." Center for Food Safety, 2014. http://www.centerforfoodsafety.org/issues/304/pollinators-and-pesticides/reports/2999/heavy-costs-weighing-the-value-of-neonicotinoid-insecticides-in-agriculture#

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From: info [mailto:info@www.hummingforbees.org]
Sent: Wednesday, April 30, 2014 9:08 PM
To: Regimbal, Gregg (MDA)
Subject: MDA - Scoping a Review of Neonicotinoid Use, Comments

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

RE: MDA Draft Article - "Scoping a Review of Neonicotinoid Use, Registration and Insect Pollinator Impacts in Minnesota"

Dear Mr. Regimbal,

My name is Jeff Dinsmore and am representing the organization Humming for Bees based in Shorewood. We are a group of 10 people with about 30 supporters in the western suburbs. Humming for Bees is dedicated to contributing to a sustainable future for bees and other pollinators by:

1. Being informed
2. Educating others
3. Facilitating policy that supports bees in one small city
4. Making that prototype available to other cities

Starting locally, Humming for Bees seeks to create "Bee Safe Yards" and a "Bee Safe City" that will be a model for others.

We are heartened that the Minnesota Department of Agriculture is proceeding with review of neonicotinoids leading to strategies for management and control of this family of insecticides. Additionally, we strongly urge the MDA to thoroughly study, review, and manage the use of neonicotinoieds in doing the following:

1. As broadly as possible study the impacts of neonicotinoids on pollinator insect populations,
2. Study the presence of neonicotinoids in our environment, from live plants, soil, water, and ground water, and in non-agricultural settings as well,
3. Publish and promote correct application practices and the possible impacts to pollinators,
4. Use and conduct research on the impacts of newer insecticides that is independent of special interests and is peer reviewed,
5. Work to reduce, minimize, and ultimately eliminate the use of neonicotinoids in both agricultural and non-agricultural environments, and
6. Promote Integrated Pest Management best practices as first and most important approach.

Humming for Bees is very concerned with the current and trending situation with honeybees and pollinators and welcomes the timely leadership from the MDA, legislature, and other state organizations on this issue.

Sincerely,

Jeff Dinsmore
Humming for Bees
Shorewood, MN

To: Minnesota Department of Agriculture
Pesticide and Fertilizer Management Division
625 Robert Street North
Saint Paul, Minnesota 55155-2538
Commissioner Dave Frederickson

Raj Mann, Research Scientist
Minnesota Department of Agriculture
rajinder.mann@state.mn.us

As a life long resident of Minnesota and a third generation commercial beekeeper, I am submitting the following comments regarding Minnesota's special registration review of Neonicotinoids (neo-nics) on behalf of myself, my family and my future business, as well as for most of the rest of the beekeepers living and operating in Minnesota.

The reasons for my comments are that the neo-nics being considered in this registration review are causing significant damage to my beekeeping operation. Since the registration and corresponding introduction and use of this class of pesticides, my annual beehive losses have jumped from historic levels of 15%, to current levels of over 60%; my annual honey production level has dropped from 10 year averages of 80 pounds per colony, to a current average of under 60 pounds; and the overall vigor of my live hives is significantly reduced. I am fairly certain that neo-nics are the proximate cause, as my bees experience excessive mortality during spring planting season and also later in the summer, during pollen and nectar production of treated soybeans and corn. It appears that the soy and corn food supply stored in the hives causes a third round of bee mortality when the hives access it during the overwintering months.

I applaud the Minnesota Department of Agriculture (MDA) for preparing to undertake this review and thank the Minnesota Legislature for recognizing that there is a problem with this class of pesticides and for them requiring MDA to do this registration review.

When reading the Draft Scope of Review, it became obvious to me that MDA is overlooking the fact that pesticide registration in Minnesota is to be held to a higher standard than the federal standard. The Common Law Principle found in *Farrell v. Minneapolis & R.R. Ry. Co.,* 121 Minn. 357, 361, 141 N.W. 491, 492 (1913) that ”landowners owe a duty to use their property so as not to injure that of others“ must be considered. “Non-injury” is a greater duty than the Environmental Protection Agency’s (EPA’s) strict cost-benefit standard. While I certainly believe that this duty applies to my bees, it goes way beyond bees and should be a considered more broadly by MDA. The pesticides in question are known to be highly toxic to other things in the environment and extremely persistent, particularly in our Minnesota Environment in which our winters stop pesticide degradation, which leads to much greater problems with bioaccumulation in our soil and water.

The process for pesticide registration starts with the Federal Insecticide Fungicide Rodenticide Act (FIFRA), which regulates the marketing and use of pesticides and authorizes the EPA to enforce the rules and approve pesticide labels; MDA has delegated authority (primacy) from EPA and is the only agency operating within Minnesota which engages the actions coming out of FIFRA and EPA regarding pesticide registration and use. In this capacity, MDA acting on behalf of EPA cannot *lower* the standards of registration or enforcement; but it is completely within the right of MDA to *strengthen* environmental protections and provide for a more restricted use label in order for a product to be registered for use in Minnesota. In some cases, perhaps this one, MDA may need to refuse registration as it is not possible to use this class of pesticide in a manner that “*does not damage the property of others.”*

MDA should also consider *Anderson v. State, DNR,* 693 N.W.2d 181 (Minn., 2005) which is binding case law in Minnesota. This case is specific to my area of concern - honeybees. The Court held “*a land possessor with actual knowledge or notice of foraging bees on the property comes under a duty of reasonable care in the application of pesticides.” Id.* at 192.

The reason that this matters deeply when determining the scope of review is that the draft proposed scope includes: federal and state registration, use, risks, and application, with possible outcomes of label clarification, enforcement education, applicator guidance and product stewardship. All are affected by this duty.

Let's start with a really major problem. Currently, the widest use of this class of pesticides, seed treatment, is not even considered by MDA to be a pesticide application. It is ludicrous that such a huge amount of pesticide is being released into Minnesota's environment, yet MDA is not regulating this use at all. Further, and this relates directly to honeybees, the nonsensical decision that pesticide treated seeds are not an application of a pesticide violates MDA's obligation to protect and ignores the state supreme court's holding in *Anderson* that one has a "*duty of reasonable care in the application of pesticides,"* and essentially evades the law articulated in *Farrell* that "*landowners owe a duty to use their property so as not to injure that of others*."

Before MDA registered this class of pesticides, they should have declared that planting of treated seeds in Minnesota is considered an application of pesticides!

Next we need to tackle the labeling of these pesticides. With the current lack of any effective label enforcement by MDA, the "commonly recognized application practice" is disregarding label prohibitions and to spray pesticides at anytime, even during bloom periods, on a perceived need basis. When this condition is present, the pesticide is to be determined "mislabeled/misbranded" and FIFRA requires that the use shall be stopped until the situation can be rectified.

While the label is the law, it is entirely possible and actually quite likely that many applicators while following the labels of these products breach the common law duty owed to foraging bees. This is no less true when it comes to any notion of stewardship as most would think that following the label is sufficient. Yet, if such use is a breach, where is the stewardship? Also, confusion will certainly reign when damages have been inflicted, yet no enforcement action is commenced because the MDA's

enforcement wing does not find the application to have been conducted outside of the label (possibly ignorant of the fact that this is not the end of the legal restrictions). This result leads to court actions, where one seeks remedies, which usually take years to resolve, often leaving the damaged person unable to ever sufficiently recover, even if they win in court. It also leads to more case law that are every bit as controlling as those of the legislature or of the MDA/EPA; yet not necessarily without conflict with each other.

Looking at concrete examples of the many issues of simply deferring to the federally constructed criteria it would be prudent to examine labels. Perhaps the most revealing problem with any of the labels is found within the new bee protection statement and the accompanying bee hazard icon, ironic as that may seem. An examination of the many pesticide labels that clearly show the product to be extremely hazardous to bees will reveal that use is not allowed -- except for when it is allowed.

FOR CROPS UNDER CONTRACTED POLLINATION SERVICES

> Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen *unless the following condition has been met* (emphasis added).
>
> If an application must be made when managed bees are at the treatment site, the beekeeper providing the pollination services must be notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

The exception above is problematic on several levels. First it is explicitly acknowledged that the product kills bees (and other pollinators); yet, somehow if applied under a particular ritual as described, it is then legal. Second, somehow the conditions that must be met are only *possibly* beneficial in preserving the contracted bees, *not other bees located on adjoining property, or managed bees in the treatment area, if they are not under contract* (not to mention all those bees that could visit the site even though they are located as much as five miles away or more). Nor is any protection provided for the other beneficial insects -- which are to be protected as well. The requirement is not should be protected, but must be protected, under federal and state law.

The exception language is even more problematic in that nothing requires the contracted bees to *actually* be removed or protected before an application can be made to the blooming crop, only that a notice of spray be provided to the beekeeper. "[C]an be removed, covered, or otherwise protected" is not actually removed, covered, or protected.

These type of an application exceptions cannot be allowed as a result of a simple cost-benefit analysis like that used by the EPA. Minnesota requires a duty owed that clearly would be breached, even if adhering to the above exception requirement. It is not reasonable to apply the product under such exceptions and actually expect anything less than damages, both to the managed bees as well as to the unmanaged pollinators.

FOR FOOD CROPS AND COMMERCIALLY GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless the following condition has been met.

- The application is made to the target site after sunset
- The application is made to the target site when temperatures are below 55 degrees Fahrenheit
- The application is made in accordance with the government-initiated public health response
- The application is made in accordance with an active state-administered apiary registry program where beekeepers are notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying

- The application is made due to an imminent threat of significant crop loss, and a documented determination consistent with an IPM plan or predetermined economic threshold is met. Every effort should be made to notify beekeepers no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

All of the same issues above are found in the exceptions for this category of crops. Additionally, other provisions are made that allow a product that one is not to apply during bloom because it is highly toxic to bees, to be applied during bloom.

An after sunset application exception of a product that has *any* residual time at all, let alone an extended residual, will simply harm or kill all visiting pollinators,

especially in Minnesota where summer nights are very short and often very humid (of course, many pollinators visit at night as well). Thus offering no protection whatsoever.

Likewise, a provision allowing an application to occur if temperatures are below 55 degrees does not protect the honey bee known to fly in 45 degree temperatures, or the bumble bee that will fly in even colder weather. Also, is this magical temperature of 55 degrees the high temperature for the day, or is it only relevant at the time the application is made?

The exceptions above seem to come out of an old mindset used with foliar applications that killed on contact and don't even begin to address the mode of these newer products in that they are systemic, killing those that consume any part of the plant, both near-term and long-term

The last issue with labeling is that EPA has no consistent requirement of Registrants following their labeling 'suggestions' just discussed above. I am supplying two additional documents, the first shows the boxes that EPA is requiring for bee protection on this class of pesticides. The second attached document contains portions of the new Admire Pro Label and problems associated with it. The short version is that while Admire Pro has bee hazard statements, not one crop is identified as being toxic to bees with a mitigation measure required.

As noted in the draft scope, neo-nics are water soluble and readily absorbed by plants via their roots or leaves. Application can be made as a soil drench or in irrigation water. Just like traditional aerial spraying which can be problematic due to wind drift, a drench or irrigation application will have a tendency to migrate. Again, if the review properly takes into consideration the common law duty to protect foraging bees, this type of application process is suspect as the pesticide is likely to end up being taken up by many more plants outside of the targeted area due to the tendency for water to flow along the path of least resistance, traveling a great distance if allowed. This tendency is

actually much more difficult to predict and control than that of wind drift, which can be mitigated.

Furthermore, despite the supposed benefits of a minimal quantity of product needed to be applied for an effective treatment, the consequences of such high potency is that minimal migration can inflict much more than minimal detrimental effects. Likewise, the other supposed benefit of this category of pesticides is the very long duration of plant protection. This proves problematic when examining potential damages to the beneficial pollinators, seeing that the killing of pollinators is stretched out for a greater period of time. If these products are killing foraging bees for days and weeks on end, it is impossible to say that the application was in compliance with the duty one has of reasonable care and likely not even in compliance with FIFRA's cost-benefit standard.

The extensive use of neo-nics across much of the world, on a great number of crops speaks to the dominance of use. Yet, the review references Minnesota sales as being a small percentage of all pesticides sold, which is terribly misleading as the percentage given is computed by weight, which makes no sense. The amount of neonicontinoids needed *by weight* is substantially less than other products due to its extremely high toxicity and excessive residual life (LD50 of 19 years in some Minnesota soils). If use calculations include the seed treatment applications, such as corn and soybeans (the bulk of the crops in Minnesota) and then is compared to acres treated, not weight sold, the resulting number would have some meaning. This would show that overall use is *extensive* and that all of the unknowns that this review hopes to address should have been completely documented already.

While I have not seen exact numbers, in Minnesota close to 80% of the soybeans are treated and over 90% of the corn. This begs the question of IPM and how much of this use is appropriate and how much is unnecessary prophylactic use, hence detractive or should be detractive on the benefit side of MDA's analysis.

I direct you to a recent Summary by Center for Food Safety, “Heavy Costs: Weighing the Value of Neonicotinoid Insecticides in Agriculture.”

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

http://www.centerforfoodsafety.org/issues/304/pollinators-and-pesticides/reports/2999/heavy-costs-weighing-the-value-of-neonicotinoid-insecticides-in-agriculture.

Links to several other studies with the same message, ‘benefits do not outweigh costs’, should also be considered during this registration review:

http://www.ars.usda.gov/research/publications.publications.htm?SEQ_NO_115=268542,

http://www.ent.iastate.edu/dept/faculty/hodgson/files/ul/Cost%20effective%20SBA%20management%20%282009%29.pdf,

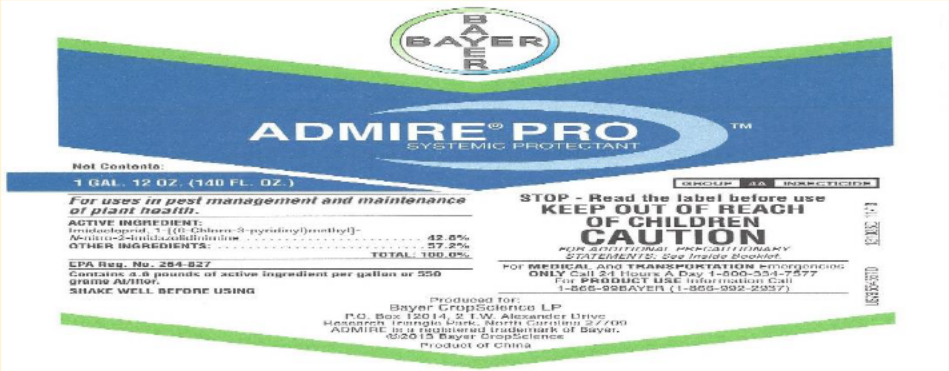
http://esa.confex.com/esa/2013/webprogram/Paper77672.html.

In conclusion, thank you to the Minnesota Legislature for requiring this registration review. I trust that if a full review is done, that MDA will conclude that neo-nics as they are currently registered are not compatible with Minnesota law. If continuing registration is granted, that it only be allowed for use on non-pollinator

attractive crops. Further, labels need to identify time needed before land can be planted with bee attractive crops, based on known residual times, which in most cases is years.

Respectfully submitted, Jeff Anderson, Owner, California Minnesota Honey Farms.

Bee Industry analysis of a "new label."



This new label was developed due to an undefined and ambiguous, and therefore unenforceable old label. Not one term in this new label is defined.

This new label, designed for systemic insecticides is now being "harmonized" for all pollinator toxic pesticides. This new label provides no practical method for avoiding the identified risks.

ENGINEERING CONTROLS STATEMENTS

- When handlers use closed systems or enclosed cabs in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations:

User should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Do not apply directly to water, areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging the treatment area. This product is toxic to wildlife and highly toxic to aquatic invertebrates.

This chemical demonstrates the properties and characteristics associated with chemicals detected in ground water. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon  in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

(continued)

Why state the product is toxic to bees "exposed to direct treatment or residues on blooming crops or weeds" and then allow the Applicator to use the product on bee attractive crops in bloom?

This bee picture is meant to tell the label reader this product is harmful to bees. Based on current icons, it should have a red line across the picture.

Admire Pro has NO hazard icon in "Directions for Use" for each application site, so no crop has pollinator use restrictions.

EPA admits exposure to the product "can kill bees and other insect pollinators" yet if one of the five "conditions" is met bees will be killed, but per the label.

New Pesticide Label Language and the five conditions where honey bees and native pollinators will be killed.

The new "Admire Pro" label does not have the Non-Agricultural Products statement.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

See individual crops for specific pollinator protection application restrictions. If none exist under the specific crop, for foliar applications, follow these application directions for crops that are contracted to have pollinator services or for food/feed & commercially grown ornamentals that are attractive to pollinators:

Applicators can treat any application as if it is on "contracted pollination" which only requires 48 hour notification to the "contracted" beekeeper on that specific property. This label would not require beekeepers on neighboring properties to be notified of an application. If a beekeeper is not "contracted" no notification is required and bees will be harmed.

FOR CROPS UNDER CONTRACTED POLLINATION SERVICES

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless the following condition has been met.

If an application must be made when managed bees are at the treatment site, the beekeeper providing the pollination services must be notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

Bees have a 3-7 mile forage range! What about bees foraging the treatment site from other properties?
Native pollinators are sacrificed, as they are not being moved.
What constitutes notifying the beekeeper?
This label allows the Applicator to choose the mitigation measure.

The "Do Not Apply" conflicts with the original Environmental Hazard Statement which does not have the "unless" conditions. What about Extended Residual Toxicity pesticides? ERT's can be toxic for weeks!

FOR FOOD CROPS AND COMMERCIALLY GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless one of the following conditions is met:

- The application is made to the target site after sunset
- The application is made to the target site when temperatures are below 55°F
- The application is made in accordance with a government-initiated public health response
- The application is made in accordance with an active state-administered apiary registry program where beekeepers are notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying
- The application is made due to an imminent threat of significant crop loss, and a documented determination consistent with an IPM plan or predetermined economic threshold is met. Every effort should be made to notify beekeepers no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

Bees will forage at temperatures as low as 45 degrees F.

What constitutes notifying the beekeeper?
Not all states have an apiary registry program? Moving hives is not a risk mitigation strategy.
What about voluntary registry programs; the label makes no distinctions?

Who decides when treatment is needed?
What are the criteria for needed treatment?
What constitutes notifying the beekeeper?
Where is the safe place to move bees?

Not one of the 5 conditions consider the pesticide's mode of action. None of the conditions make sense for systemic pesticides.

PROTECTION OF POLLINATORS

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon  in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:
http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx.

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state, go to: www.aapco.org/officials.html. Pesticide incidents should also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

This new label was developed due to an undefined and ambiguous, and therefore unenforceable old label. Not one term in this new label is defined.

The new 'Admire Pro" label has no bee hazard icon.

EPA admits exposure to the product "can kills bee and other insect pollinators" by residues, direct contact, ingestion in nectar and pollen, but if one of the five "conditions" is met bees will be killed, but per the label.

Why state the "ingestion of residues in nectar and pollen" through seed treatments, soil, tree injection, and foliar applications" are harmful to bees and then allow the Applicator to use the product on bee attractive crops in bloom?

This new label, designed for systemic insecticides is now being "harmonized" for all pollinator toxic pesticides. This new label provides no practical method for avoiding the identified risks.

The Bee Industry strongly objects to sending Applicators to a Pesticide Industry website.

Due to the five conditions on this new label what would constitute a "pesticide incident?"

New Pesticide Label Language and the five conditions where honey bees and native pollinators will be killed.

DIRECTIONS FOR USE

1. FOR CROPS UNDER CONTRACTED POLLINATION SERVICES

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless the following condition has been met.

If an application must be made when managed bees are at the treatment site, the beekeeper providing the pollination services must be notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

2. FOR FOOD CROPS AND COMMERCIALLY GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS

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- The application is made in accordance with an active state-administered apiary registry program where beekeepers are notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying
- The application is made due to an imminent threat of significant crop loss, and a documented determination consistent with an IPM plan or predetermined economic threshold is met. Every effort should be made to notify beekeepers no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

3. Non-Agricultural Products:

Do not apply [insert name of product] while bees are foraging. Do not apply [insert name of product] to plants that are flowering. Only apply after all flower petals have fallen off.

Not one of the 5 conditions consider the pesticide's mode of action. None of the conditions make sense for systemic pesticides.

This bee picture is meant to tell the label reader this product is harmful to bees. Based on current icons, it should have a red line across the picture.

Bees have a 3-7 mile forage range! What about bees foraging the treatment site from other properties? Native pollinators are sacrificed, as they are not being moved. What constitutes notifying the beekeeper? This label allows the Applicator to choose the mitigation measure.

The "Do Not Apply" conflicts with the original Environmental Hazard Statement which does not have the "unless" conditions. What about Extended Residual Toxicity pesticides? ERT's can be toxic for weeks!

Bees will forage at temperatures as low as 45 degrees F.

What constitutes notifying the beekeeper? Not all states have an apiary registry program? Moving hives is not a risk mitigation strategy. What about voluntary registry programs; the label makes no distinctions?

Who decides when treatment is needed? What are the criteria for needed treatment? What constitutes notifying the beekeeper? Where is the safe place to move bees?

The new "Admire Pro" label does not have the Non-Agricultural Products statement.

From: Jeff [mailto:j.dinsmore@mchsi.com]
Sent: Wednesday, April 30, 2014 5:37 PM
To: Regimbal, Gregg (MDA)
Subject: Comments on Draft Article- Scoping a Review of Neonicotinoid Use

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

RE: MDA Draft Article - "Scoping a Review of Neonicotinoid Use, Registration and Insect Pollinator Impacts in Minnesota"

Dear Mr. Regimbal,

My name is Jeff Dinsmore and live in Shorewood. I am a hobby beekeeper in a suburban environment now beginning my sixth season. This remarkable activity has given me knowledge and insights into pollinator insects, their role in food production, and the state of our environment. With recent news articles and documentaries, as well as my own experiences, has highlighted the presence and effects of pesticide use not only in rural, agricultural settings, but in the urban and suburban environments as well. The issues around the almost ubiquitous use neonicotinoid insecticides without adequate public awareness, research, and understanding of the impacts, is essentially the same in the urban/suburban environment as that of rural, agricultural areas.

I am very encouraged that the Minnesota Department of Agriculture is proceeding with review of neonicotinoids leading to strategies for management and control of this family of insecticides. Additionally, I would like to strongly encourage the following:

1. Thorough study of the impacts of neonicotinoids on the pollinator insect populations,
2. Thorough study of the presence of neonicotinoids in our environment, from live plants, soil, water, and ground water, in non-agricultural settings as well,
3. Information on application practices and the impacts to pollinators must be made readily available and promoted,
4. The research on the impacts of newer insecticides be independent of special interests and is peer reviewed,
5. The MDA works to reduce, minimize, and ultimately eliminate the use of neonicotinoids in both agricultural and non-agricultural environments, and
6. The MDA promote Integrated Pest Management best practices as first and most important.

In conclusion, time is of the essence as evidenced by the extent of honey bee colony collapse nationwide and less known impacts to pollinator insects. Minnesota must move forward and be a leader in this important area.

Sincerely,

Jeff Dinsmore
5805 Minnetonka Dr.
Shorewood, MN 55331

From: Jim & Chris Whitlock
To: Regimbal, Gregg (MDA)
Subject: Neonicotinoids
Date: Friday, May 02, 2014 2:52:44 PM

In my opinion this chemical is one of the most damaging and widely used our society has ever had available. It definitely kills insects, targeted, as well as beneficial. Most past used insecticides were oil base. Oil has a tendency to float up so the sun can break it down, where as water can go down or float off with rain run off into our ponds, streams or lakes. I live in SE Minnesota which has many collect pond basins. These ponds are a death trap for bees, collecting water. I have always admired honeybees because they are a social insect and are willing to give their life for their society. In the human society it seems we are only interested in wealth, or prestige. One exception being our military. Where are you? Sincerely, Jim Whitlock

From: Laurie Schneider [mailto:laurie@lschneider.com]
Sent: Friday, May 02, 2014 9:10 AM
To: Regimbal, Gregg (MDA)
Subject: Comments about Scoping a Review of Neonics Document

Dear Gregg, I have read the document "SCOPING A REVIEW OF NEONICOTINOIDS USE, REGISTRATION AND INSECT POLLINATOR IMPACTS IN MINNESOTA" by the MDA Pesticide & Management Division.
My overall impression is that this document is both pointing out some serious problems with neonics and also taking this situation too lightly. I encourage our State to be a leader and ban neonics now until the information received satisfies those in government making the decisions for the rest of us. As a Minnesota citizen, I can tell you that everyone I encounter who is aware of this issue, is troubled and perplexed as to why these chemicals continue to be used. Beekeepers and farmers that rely on pollinators are angry and feel disempowered as these chemical practices continue. Minnesota Beekeepers are reporting 60-70% losses this last winter with no recovery. Are you aware of this! And this is happening all over the country. My brother is the supplier in Missouri for bees to the entire Southern region. Four days ago he opened his delivery truck full of bee packages and found almost all of them dead —- 100,000's of bees, 100's of colonies of bees!!! Every year the bees are weaker and weaker because neonicotinoids and large scale mono crops and loss of habitat continue. This is a horrible loss and this type of thing is not reported to the government. So, although there might be surveys out there being calculated, MDA cannot possibly know of all the losses and the wide reaching scope of the problem. Other countries have banned neonics. I don't understand why the US and why Minnesota in particular cannot take a firmer, more forward thinking approach. These chemicals should be banned now UNTIL the research and studies satisfy those decision makers. I am certain time will show that bees and pollinators cannot survive as long as these chemicals are being used. Moving forward, the review and registration of these pesticides needs to be much more discriminating and NOT allow these pollinator killing pesticides to be used. We all know that the minute these neonics are banned, Bayer and other companies will present new pollinator killing chemicals that are similar or worse. In fact, we know this is already happening. The government is charged with protecting not only human health, but also our way of life. Systems in place are not doing this at present. I believe in years to come, our descendants and children will look at our generation as the problem and they will be left with a world very unlike this one without the variety of food, clean water and air to breath, and a lloss of the natural world. The loss of pollinators will create a domino affect where other creatures and plants will also disappear. On a personal note, I have an illness called disautonomia which was caused by a virus. My nervous system is highly sensitive. Whenever I am in the vicinity of any of these products by drift, I have servere health problems including loss of automatic breathing, trembles, vision affects, vertigo, nausea and other symptoms. So I am aware more than most that these chemicals do affect humans and other animals, even the drift. And I am a big animal…imagine being a small sensitive honeybee!

Thanks for your work on this very important project. I believe this is the number one most serious issue in our world today. Without pollinators, food, a healthy environment, and our own good health… a life is not worth living. Remember Silent Spring?

Bee well,
Laurie Schneider
Beekeeper & Pollinator Conservation Steward
Member of Minn Beekeeper Assoc, & Stillwater Bee Club
9503 Norell Avenue
Stillwater, MN 55082
651-351-1100

From: Margot Monson [mailto:mpmonson.insx@gmail.com]
Sent: Thursday, May 01, 2014 10:19 AM
To: Regimbal, Gregg (MDA)
Subject: Neonicotinoid review

April 30, 2014

Gregg Regimbal

Pesticide and Fertilizer Management Division

Minnesota Department of Agriculture

625 Robert Street North

St. Paul, MN 55155-2538

Dear Mr. Regimbal,

RE: MDA scoping of neonicotinoid review

As an aquatic entomologist who has done research in wetlands and a beekeeper, I am deeply concerned about the use of the systemic pesticides, especially the neonicotinoids, in proximity to aquatic habitats of any kind, because of the potential impact on the invertebrates so important in maintaining the stability of those ecosystems. I hope you understand my concerns about their use in agricultural areas because of the implications for their role in the growing losses in honey bee colonies; I don't often hear it mentioned, but it should be obvious that whatever affects honey bees will also impact our native pollinators, and they are crucial to the health of any landscape. We can estimate the numbers of honey bees that have been lost, but no one is counting the losses to, depending on the taxa, hundreds to thousands of different species of other insect pollinators, such as the solitary native bees, Syrphid flies, solitary wasps, beetles, moths, and except for monarchs, butterflies.

The health and integrity of our rural landscapes depend on *all* our pollinators. Over the past 40 years we have driven from our home in St.Paul to the western MN prairies where my husband grew up and the land is increasingly quiet and devoid of native plants, or even patches and borders where wildlife was previously sustained; we no longer hear the sounds of insects and birds, nor see the many small farmsteads that dotted the land. With the larger farms made up of even larger acreages of monocultures, the concentrations of systemic pesticides have grown and are increasing in the soil.

I applaud the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through common-sense action to protect bees from neonicotinoids.

In addition to the proposed scope of MDA's review of neonicotinoids, I recommend the following additions:

1. As part of a review of neonicotinoids, MDA should investigate options for **reducing and restricting the use of neonicotinoid insecticides**—and, hence, the risk of pollinator exposure. Minnesota policy-

makers and the public would benefit from MDA"s perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.

Strategies for reducing neonicotinoid use may include both voluntary steps (like BMP's, or increasing availability of untreated seeds and plants for farmers and gardeners) and regulatory action (tracking neonicotinoid seed treatments, or classifying neonicotinoids as restricted use pesticides). The review should include MDA's perspective on the opportunities and obstacles associated with various approaches to reducing the use of neonicotinoids.

2. In assessing the benefits of neonicotinoid use in Minnesota agriculture, MDA should take into consideration the growing body of scientific research indicating that neonicotinoid seed treatments on corn, soy, canola, wheat, and dry beans **do not consistently increase yields or profitability**.[i] A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered farmers any economic benefits."[ii] A 2006 study *by one of our UMN entomologists, Prof. Dave Ragsdale,* of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the grower."[iii] Peer-reviewed research on yield impacts of neonicotinoids on Minnesota's major crops must be included in MDA's assessment.

3. With growing evidence of systemic pesticide impacting pollinators, those of us living in the city have asked for transparency in the labeling of seeds and plants sold in nurseries and garden centers that have been treated with these chemicals, so we can avoid purchasing plants that may harm the beneficial insects that are attracted to our yards and gardens.

The Minnesota Department of Agriculture's review of neonicotinoids comes at an excellent time, as new laws to protect pollinators move through the legislature and growing numbers of Minnesotans call for even stronger solutions to bee declines. MDA's engagement on this issue is laudable and reflects the agency's bold commitment to pollinator protection. MDA's engagement shouldn't stop with an assessment of current impact of neonicotinoids, but instead, work to minimize the usage and effects of neonicotinoids in order to protect our state's agricultural system and safeguard pollinators.

Sincerely,

Margot Monson, MS Entomology

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[i] For a review of 19 independent studies that considered the efficacy and yield benefits of neonicotinoid insecticides, see "Heavy Costs: Weighing the Value of Neonicotinoid Insecticides in Agriculture." Center for Food Safety, 2014. http://www.centerforfoodsafety.org/issues/304/pollinators-and-pesticides/reports/2999/heavy-costs-weighing-the-value-of-neonicotinoid-insecticides-in-agriculture#

[ii] Petzold-Maxwell, JL, LJ Meinke, ME Gray, RE Estes, and AJ Gassmann. 2013. Effect of Bt maize and soil insecticides on yield, injury, and rootworm survival: implications for resistance management. *Journal of Economic Entomology*, 106(5): 1941- 1951.

[iii] McCornack, BP and DW Ragsdale. 2006. Efficacy of thiamethoxam to suppress soybean aphid populations in Minnesota soybean. *Crop Management*, 5(1).

Margot Monson

From: Bill Bond [mailto:bill@mcpr-cca.org]
Sent: Thursday, May 01, 2014 5:02 PM
To: Mann, Rajinder (MDA)
Subject: MDA Scoping Document for Legislatively Mandated Neonicotinoid Review.

Memo to: **Raj Mann, MDA**

From: **Bill Bond, MCPR Executive Director**

Re: **Scoping Document for Legislatively Mandated Neonicotinoid Review.**

Date: **May 1, 2014**

The Minnesota Crop Production Retailers(MCPR) is submitting these comments related to the Minnesota Department of Agriculture (MDA) Scoping Document for Legislatively Mandated Neonicotinoid Review.

MCPR insists that the MDA utilize exclusively a science based review of Neonicotinoids. Much pseudo-science and hyperbole has influenced some public policy makers, which has done a large disservice to Minnesotans. This legislatively mandated review is one such example of such hysteria and fear mongering. The MDA must focus primarily on the safe and prudent use of these products as indicated on the label because these products are extremely important as tools for pest control in Minnesota.

This review, unfortunately, seems to be duplicative of an number of other federal studies and efforts related to these products. There is currently extensive work underway by US EPA, USDA and others to better understand the complex set of factors which currently affect pollinator health. US EPA has been working with the pesticide registrants to advance the science as it relates to pesticide use, while reviewing products through the registration and reregistration process. MDA should focus on Label & Best Management Practices (BMP) Education and Communication between stakeholders. Also, MDA should continue to encourage apiarist to register their hives on DriftWatch to insure that agricultural producers and applicators are aware of hive locations.

Most of uses of these products in MN are through seed treatments, which are viewed by US EPA as a reduced risk / reduced use application. Clearly they treat a significantly smaller portion of the field and pose less risk than above ground broadcast applications to the entire field. MDA needs to understand that “seed treatments” are an important tool in an IPM program where below ground pest are expected. Below ground pest cannot be scouted for in advance the same as spider mites or aphids which occur above ground later in the season. There are few alternatives and once stand establishment is negatively impacted it is too late and yields are impacted by a reduction in plant population. Seed treatments are critical in any IPM program and ensure stand establishment where below ground pest have historically impacted crop emergence.

Minnesota
Agri-Growth Council

May 1, 2014

Gregg Regimbal
Pesticide & Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
Saint Paul, MN 55155-2538

Dear Mr. Regimbal,

The Minnesota Agri-Growth Council (Agri-Growth) respectfully submits the following comments regarding the Minnesota Department of Agriculture's (MDA) review of neonicotinoids insecticides and their effects on pollinator populations.

Pollinators provide important benefits to Minnesota agriculture, and we share the concerns from many perspectives over their declining numbers. As acknowledged by the National Stakeholders Conference on Honey Bee Health Report in 2013, the causes of Colony Collapse Disorder (CCD) are likely due to a number of factors, including parasites, viruses, bee nutrition deficiencies, and habitat and pesticide exposure. It is in our collective best interest to determine the causes of CCD and to adopt methods to reduce the risk of occurrences in a responsible manner.

There have been numerous benefits to production agriculture in utilizing neonicotinoid products to control insects, and we request that these benefits be acknowledged and considered during this review process. As referenced by MDA in its scoping document, neonicotinoids were originally developed as a safer alternative to other insecticide products, and were thus designated a "reduced risk pesticide" by the USEPA. The neuro-receptor targeted by neonicotinoids is limited to insects, resulting in a vastly safer product for human consumption while minimizing the pesticide's impact on other animal species. As opposed to other pesticide classes, neonicotinoids have a much lower likelihood of their target species developing a resistance to the product resulting in a lower net application of insecticides and fewer opportunities for unwanted drift.

As MDA undertakes its review of neonicitinoid use, registration, and impacts on the pollinator pollination in Minnesota, we strongly urge that the methods and analysis employed in this review be science-based. The debate and proposed policies to address pollinator issues has at times been based on conjecture; MDA's review process should seek to maximize usage of available science-based data and research. This review is likely to be an important source of information for future debate regarding neonicotinoids and should serve as a solid, credible base from which policymakers, government, and stakeholders can be better informed on causes of pollinator losses and on ways to develop appropriate solutions to this issue.

Agri-Growth also asks that MDA take into consideration the voluntary efforts currently underway to reduce pollinator exposure to pesticides, as well as industry improvements in application technology and methods that can help in mitigating any adverse impacts of neonicotinoids. It is in the interest of the agriculture industry to minimize collateral damage to plant-friendly insects, and stakeholders from across the ag sector have committed to efforts that ensure awareness and adaption of Best Management Practices to help minimize pollinator exposure to pesticides. We would also request MDA undertake additional efforts to encourage both applicators and beekeepers to utilize tools such as *DriftWatch* to help minimize pollinator exposure to pesticides.

Finally, we request that MDA ensures a holistic approach to developing solutions to the loss of pollinators, given that the most current science indicates neonicotinoids are not the sole factor negatively affecting pollinators, but one of many factors. We acknowledge that all stakeholders have a vested interest in the health of pollinator populations and that we all have a responsibility to undertake measures to counteract threats to it. However, we must allow scientific evidence to inform any recommendations or decisions on this issue going forward.

Thank you for the opportunity to provide comments on this important issue. Please don't hesitate to contact Agri-Growth should we be able to provide assistance or additional information as this review moves forward.

Sincerely,

Perry Aasness
Executive Director
Minnesota Agri-Growth Council

Minnesota Farm Bureau® Federation
Farmers • Families • Food

May 2, 2014

Minnesota Department of Agriculture
Pesticides and Fertilizer Management Division
625 Robert St. North
St. Paul, MN 55155-2538

Re: Scoping Review For Neonicotinoid Use, Registration and Insect Pollinator Impacts In Minnesota

Dear Sirs:

This letter serves as Minnesota Farm Bureau's comments regarding the scoping process for review of neonicotinoids being conducted by the Minnesota Department of Agriculture. Minnesota Farm Bureau is the state's largest general farm organization representing nearly 30,000 member families. Our broad-based membership interests of various commodity and production methods helps us to offer a perspective which we hope will be beneficial in the long-range and on-going deliberations of pollinator health/well-being.

As we submit our thoughts on the scoping process we want it to be clearly understood that we do care about healthy and productive pollinator populations. Our member-developed, member-adopted policy position supports:

> ***"Rebuilding viable and vibrant pollinator communities through continued research across all lands in pollinator populations"***

In general we are in concurrence with the outline for the plans for the review process we see presented in the "Draft" scoping document. It is especially important to draw attention to the purpose of this review as identified in the "Draft" when it states, *"...these reviews are not intended to be redundant of analyses and decisions reached by the United States Environmental Protection Agency during federal registration."*

Minnesota Farm Bureau supports the scope of the neonicotinoid review as including an overview of federal and state pesticide programs, roles and responsibilities related to the registration and use of neonicotinoids in Minnesota.

We also support the scoping criteria, which has been outlined in the "Draft" scoping document as:

Physical Address: 3080 Eagandale Place, Eagan, MN 55121-2118 Mailing Address: P.O. Box 64370, St. Paul, MN 55164-0370
Phone: 651.768.2100 Fax: 651.768.2159 Email: info@fbmn.org www.fbmn.org

- Neonicotinoid background, chemistry and mode of action;
- Federal and state neonicotinoid registration;
- Neonicotinoid use and sales;
- Risk of neonicotinoid use;
- Neonicotinoid application and movement in the environment; and
- Benefits of neonicotinoid use

As a minor suggestion for the flow and presentation of the review there might be value in moving the bulleted topic "***Neonicotinoid application and movement in the environment***" to immediately follow "***Neonicotinoid use and sales***". This rearrangement would match the use and sales with the application and also more closely align "risk" and "benefits".

The notation that the Minnesota Department of Agriculture review will summarize the EPA's neonicotinoid registration review activity is very important in helping everyone understand the inter-relationship between the multiple levels of regulatory oversight between federal and state agencies. The Minnesota Department of Agriculture's documentation of their role/responsibility for monitoring EPA registration schedules for future neonicotinoid products is also a sound concept to cover in the review.

While we understand that the review will appropriately identify risk and benefits we raise the point for consideration that the use of neonicotinoid use runs counter to integrated pest management (IPM). **We don't believe that taking the approach of identifying neonicotinoid use in "prophylactic insect control" as being counter to IPM is an irrefutable point of fact.** There are sound management principles for using seed treated with a neonicotinoid application.

The draft statement under the heading, "Risk of Neonicotinoid Use" states that "*IPM is predicated on minimizing use and increasing efficacy of appropriately-timed chemical pesticides via monitoring of pest populations, making maximum use of biological and cultural controls, and only applying chemical pesticides when needed.*"

Various notations throughout the "Draft" scoping document indicate that neonicotinoid benefits include several noteworthy aspects:

- Effective at very low concentrations
- Less toxic to mammals
- Not cross-resistant to available classes of insecticides
- Systemic movement within the plant reduces direct pesticide exposure and reduces drift

These benefits closely mirror the underlying intentions and principles of IPM regarding responsible, wise and effective use of pest control measures. Because of these benefits we don't believe it should be a pre-determined assumption against neonicotinoids as being counter to IPM.

It needs to be clearly understood and reflected in the review that the purpose for neonicotinoid use as a seed treatment is to get crops established. Buried in the soil the treated seed does not pose a threat to pollinators, beyond the risk associated with dust-off that possibly came from the planting process, yet without the treatment the seed may not grow to become a plant.

Elsewhere in the "Draft" scoping document, under the sub-heading of "Risk to Insect Pollinators" the statement is made that there is little information on the actual concentrations of neonicotinoids found in pollen and nectar of treated crops.

It would be useful to include in the final review document those areas which need greater research attention. In addition, properly placing in context that not all crops are fertilized by pollinators which would result in varying consequences or risk exposure.

The section entitled ***"Neonicotinoid Applications and Movement in the Environment"*** identifies that the review will include an assessment of partitioning, fate and transport of neonicotinoid insecticides in the environment based on a variety of use patterns and scenarios, including an overview of relevant Minnesota Department of Agriculture water quality monitoring data. We encourage that by covering this topic there should be appropriate context on the level (or degree) of detection as well as the scientific basis for categories of detected levels in groundwater/surface waters to be evaluated as being a risk. The detection levels should also be identified in comparison to established water quality standards to assist in determining the context of how significant this issue might be.

Summary:

In closing, Minnesota Farm Bureau appreciates this opportunity to comment to the ***"Scoping Review For Neonicotinoid Use, Registration and Insect Pollinator Impacts In Minnesota."*** We further agree in the overall approach the review is described as moving forward and the fundamental proposed criteria to be covered.

Sincerely,

Kevin Paap

Kevin Paap
President

Steve Ellis

Old Mill Honey Co public comments on the proposed "scoping document of neonicitinoid pesticides and pollinators."

First, I would like to compliment the legislators, and the personnel at the MDA for their efforts to delve into the important subject of protecting pollinators from the unique dangers posed by neonicitinoid systemic pesticides.

As a commercial beekeeper for over 35 years, and as someone who has served as the Secretary of the National Honey Bee Advisory Board for the past six years working for both national Beekeeping organizations to address pesticide policy issues, I have gained some unique insights I would like to offer to the MDA.

First, regarding your list of collaborators to this project, there is a striking absence of practical in the field beekeeping with experience seeing the effects of neonics on pollinators first hand. Former State Bee Inspector, and current MDA staffer, Blane White and or some of the beekeepers that have experienced and reported mortality incidents to MDA should be included. There is no substitute for having seen these impacts on your own bees.

The draft list of Criteria to be reviewed is quite broad and vague. I would like to include some more details to this outline to ensure that all relevant issues are given consideration.

- Federal and State registration: It is important to note that the registration of these chemicals is being actively challenged in Federal court. Legal actions challenge the registration process

for Clothianidin, Thiamethoxam, and Sulfloxiflor. Pollinator concerns are central to both of these challenges.

- Neonic use and sales: For the sake of full disclosure, MDA should disclose any direct or indirect revenue it receives from the use and or sales of neonic products in the State of Minnesota. Retail sales of these products at home and garden centers and hardware stores needs to be included in total use in the state. Often "small" unit sales are not tabulated. Seed treatments are preformed by a variety of entities, including individual farmers. All seed dressing with neonics needs to be counted, not just those put on before it gets in the bag. Mere tabulation of pounds of active ingredients will not tell the whole story. Neonics as a class are 7,000 times more toxic to bees than DDT. A toxicity quotient is more indicatitve of the hazard these compounds present to pollinators. Use of synergistic products like certain fungicides can cause these compounds to be vastly more toxic yet. Use of all synergistic products needs to be evaluated and tabulated as well.
- Risks of neonic use: There are specific risks posed by neonics, which are unique to this chemical class. Destruction of the immune system is accomplished by neonics and not other classes of pesticides. The systemic nature of these compounds allows them to be taken up, stored and bio accumulated year after year by trees, brushy plants, and perennials. These compounds can become "locked up" for many years in such plants and expressed into the pollen and nectar of their blossoms year after year, increasing with each new years exposure. To fully understand the impact of neonicitinoid exposure on pollinators, Dr Jeff Pettis of USDA continually emphasizes that the "sub lethal and chronic" exposures must be factored in. A colony of honey bees is a super organism, which must be able to perform numerous complex functions. Impared bees will not be able to do these tasks, even though they are not outright killed by the chemical exposure in 24 or

48 hours. I am attaching a link to German research which shows graphically how an "impared bee" cannot find her way home. (link is) **https://www.youtube.com/watch?v=5nVUsv2jH3c**

- neonics applications and movement in the environment: Highly persistent in soils, some studies showing a 10 year ½ life, these compounds will be accessible for successive rotational crops, many of which are highly attractive to pollinators. Water-soluble ensures that this compound will go readily into water, be it surface piddling (detections in corn field puddles have been detected at lethal doses for pollinators), streams sloughs and lakes will all catch these compounds. Studies from Manitoba show alarming levels of neonics in prairie potholes after canola seeding. This class of chemicals uniquely threatens Minnesota's vast water resources.
- Benefits of Neonic use: Some excellent work has been done by Dr Christian Kruptke of Purdue University, as well as by Dr Jonathan Lundgren USDA on the benefits of neonic seed coatings of corn and soybeans. Their conclusion, "no yield benefit for most applications." I hope their work will be included in this reports scope. It has been also noted by both these authors, that other beneficial bugs besides pollinators are killed by neonics, particularly predatory bugs. Often by killing off these beneficial predatory bugs, secondary infestations are worse in the later season, requiring additional insecticide applications. I am providing a link to a report dated March 2014 entitled "Heavy Costs weighing the value of neonicotoid insecticides in Agriculture." http://www.centerforfoodsafety.org/issues/304/pollinators-and-pesticides/reports/2999/heavy-costs-weighing-the-value-of-neonicotinoid-insecticides-in-agriculture .Please consider the material in this work as fully submitted for this public comment for inclusion into the scope of the MDA review.

I hope the special concerns voiced by many beekeepers around the state of Minnesota, both through incident reporting of bee kills due to neonics, as well as the beekeeper petition to the Commissioner to immediately suspend the use of neonic seed treatment on field corn will be included in the scope of this review;

Sincerely,

Steve Ellis
Old Mill Honey Co
20501 Co Rd 5
Barrett, MN 56311

May 1, 2014

From: Patrick Kerrigan
To: Regimbal, Gregg (MDA)
Subject: Comments for MDA Neonicotinoid Review
Date: Friday, May 02, 2014 6:00:43 PM
Attachments: OCA Comments for MDA neonic review.docx

Dear Gregg,
Thank you so much for addressing the growing threat of neonicotinoids.
Attached is comments of the Organic Consumers Association, please let me know if you have questions or would like additional information.
Thanks!
Pat

Campaigning for Health, Justice, Sustainability, Peace and Democracy
Patrick Kerrigan
Retail Education Coordinator
Organic Consumers Association

218-220-9622

May 1, 2014

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

RE: MDA scoping of neonicotinoid review

Dear Mr. Regimbal,

My name is Pat Kerrigan, I am Retail Education Coordinator of the Organic Consumers Association, and am based in Minneapolis. OCA campaigns for health, justice, sustainability, peace and democracy. We have more than a million members nationwide and an estimated 20,000 members in Minnesota.

OCA applauds the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Historically, Minnesota has ranked in the top 5 honey-producing states in the nation. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through common-sense action to protect bees from neonicotinoids.

OCA is working actively to address Colony Collapse Disorder. We are a member of the national Save the Bees Coalition, have testified on neonicotinoid truth in labeling bill and worked with national groups on the Show Bees Some Love actions at Home Depot stores in Minneapolis and five other communities this past February.

In addition to the proposed scope of MDA's review of neonicotinoids, OCA recommends the following additions:

1. As part of a review of neonicotinoids, MDA should investigate options for **reducing and restricting the use of neonicotinoid insecticides**—and, hence, the risk of pollinator exposure. Minnesota policy-makers and the public would benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.

   Strategies for reducing neonicotinoid use may include both voluntary steps (like BMP's, or increasing availability of untreated seeds and plants for farmers and gardeners) and regulatory action (tracking neonicotinoid seed treatments, or classifying neonicotinoids as restricted use pesticides). The review should include MDA's perspective on the opportunities and obstacles associated with various approaches to reducing the use of neonicotinoids.

2. In assessing the benefits of neonicotinoid use in Minnesota agriculture, MDA should take into consideration the growing body of evidence indicating that neonicotinoid seed treatments **do not consistently increase yields or profitability**[i] when used on major Minnesota crops like corn, soy, canola, wheat, and dry beans. A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered farmers any economic benefits."[ii] A 2006 study of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the grower."[iii] Peer-reviewed research on yield impacts of neonicotinoids on Minnesota's major crops must be included in MDA's assessment.

3. [add anything else that you think is especially important for MDA to consider as they review neonicotinoids]

The Minnesota Department of Agriculture's review of neonicotinoids comes at an excellent time, as new laws to protect pollinators move through the legislature and growing numbers of Minnesotans call for even stronger solutions to bee declines. MDA's engagement on this issue is laudable and reflects the agency's bold commitment to pollinator protection. MDA's review shouldn't stop with an assessment of current impact of neonicotinoids, but instead, work to minimize the usage and effects of neonicotinoids in order to protect our state's agricultural system and safeguard pollinators.

Sincerely,

[i] For a review of 19 independent studies that considered the efficacy and yield benefits of neonicotinoid insecticides, see "Heavy Costs: Weighing the Value of Neonicotinoid Insecticides in Agriculture." Center for Food Safety, 2014. http://www.centerforfoodsafety.org/issues/304/pollinators-and-pesticides/reports/2999/heavy-costs-weighing-the-value-of-neonicotinoid-insecticides-in-agriculture#

[ii] Petzold-Maxwell, JL, LJ Meinke, ME Gray, RE Estes, and AJ Gassmann. 2013. Effect of Bt maize and soil insecticides on yield, injury, and rootworm survival: implications for resistance management. *Journal of Economic Entomology*, 106(5): 1941- 1951.

[iii] McCornack, BP and DW Ragsdale. 2006. Efficacy of thiamethoxam to suppress soybean aphid populations in Minnesota soybean. *Crop Management*, 5(1).

May 2, 2014

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

Dear Mr. Regimbal,

Thank you for the opportunity to submit comments and participate in the Minnesota Department of Agriculture's review of neonicotinoids.

These comments are submitted on behalf of Pesticide Action Network and our 2760 members in the state of Minnesota. Pesticide Action Network (PAN) works to replace the use of hazardous pesticides with ecologically sound and socially just alternatives.

Pesticide Action Network applauds the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Historically, Minnesota has ranked in the top five honey-producing states in the nation. Common-sense action to protect bees from neonicotinoids will allow our state to remain an important honey producer and summer home for our nation's honey bees.

PAN recommends additions to the following sections of the scoping document for MDA's review of neonicotinoids:

Neonicotinoid use and sales:

Tracking seed treatment sales data: As MDA's scoping document notes, because federal law (40 CFR section 152.25) currently exempts seed treatments as treated "articles," thorough information on this usage of neonicotinoids is currently unavailable to legislators, regulators, and the public. Because of this gap in data and regulation, we urge MDA to develop a mechanism for tracking neonicotinoid seed treatments in Minnesota and a plan for its implementation .

Benefits of neonicotinoid use:

Inconsistent yield and profitability impacts of neonicotinoids: In assessing the benefits of neonicotinoid use in Minnesota agriculture, MDA should take into consideration the growing body of scientific research indicating that neonicotinoid seed treatments on key Minnesota crops like corn[i], soy[ii], canola[iii], wheat[iv], and dry beans[v] do not consistently increase yields or profitability.

A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered farmers any economic benefits."[vi] A 2006 study of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the grower."[vii] These studies, and other independent scientific research, must be included in MDA's assessment of the role of neonicotinoids in Minnesota's agricultural production.

Risks of neonicotinoid use:

Shift away from IPM: MDA's scoping document mentions that "widespread adoption of systemic neonicotinoids for prophylactic insect control may contribute to a paradigm that moves away from

integrated pest management (IPM)." This potential paradigm shift in our state's agricultural practices deserves more significant attention from MDA than is signaled in the scoping document. MDA's review should assess how prophylactic neonicotinoid use has already altered agricultural practices, and the economic and environmental impacts of continued departures from IPM practices.

Costs to farmers: For farmers, the cost of using prophylactic seed treatments is frequently not offset by benefits in terms of yield increases.[viii] Neonicotinoid seed treatments introduce insecticides into the agricultural system regardless of insect pressures. In years when pest pressures do not meet the economic threshold for pesticide treatments, this prophylactic approach costs farmers money, cultivates insect resistance, and introduces persistent insecticides into soil and water without any added benefit for Minnesota farmers.

Impacts on natural pest enemies: Neonicotinoids affect not only beneficial pollinators, but also natural enemies of insect pests. According to a 2012 paper about the impacts of imidacloprid and thamiethoxam seed treatments for soybeans, "prescriptive use of some of these insecticides may harm long-term IPM of soybean pests by reducing the abundance of their key natural enemies,"[ix] while failing to contribute to increased yields or profitability for farmers.

Synergstic effects of multiple pesticides on pollinators: Emerging research indicates that the harmful effects of insecticides on pollinators can be exacerbated by simultaneous exposure to other agricultural chemicals, including fungicides and "inert" ingredients in pesticide formulations.[x] MDA's review should consider common pesticide combinations used in Minnesota agricultural regions—applied together to the same crop, or to different crops within a honey bee's foraging radius—and include research on the synergistic effects of these pesticides on pollinators.

Neonicotinoid applications and movement in the environment:

Nursery plants as routes of exposure: Last year, a pilot study revealed that plants sold at home garden stores are frequently pretreated with neonicotinoid insecticides, with no warning to consumers.[xi] Minnesotans have expressed high levels of concern over this issue. Due to public concern, the Minnesota legislature is currently considering legislation barring nurseries from labeling plants as "bee-friendly" if they have been treated with neonicotinoids. MDA's review should include attention to this route of exposure.

Beyond these additions, PAN also recommends that MDA outline options for reducing and restricting the use of neonicotinoid insecticides—and, hence, the risk of pollinator exposure—in the state of Minnesota. Minnesota policy-makers and the public would greatly benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water. The scope of MDA's review should include information on the opportunities and obstacles that would arise with various policy options towards this end. Policy recommendations for consideration could include, but are not limited to:

- Increasing availability of seed that is not pretreated with neonicotinoids
- Classifying neonicotinoids as restricted use pesticides
- Requiring labeling for all plants, starts, and seedlings pretreated with neonicotinoids
- Assessing an additional fee for registration of neonicotinoids to fund research into less-toxic alternatives to these products
- Tracking usage of neonicotinoid seed treatments, both by amount used and by the number of acres planted with treated seed
- Creating a Minnesota supplemental label with additional use restrictions. A Minnesota supplemental label should replace advisory language with enforcement statements that protect beekeepers from exposure or drift onto beehives.
- Developing environmental monitoring protocols to track the occurrence and distribution of neonicotinoids in Minnesota's waters and soils.

We look forward to further discussion about these comments and MDA's efforts to protect bees from neonicotinoids.

Sincerely,

Lex Horan
Organizer

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From: Patricia Hauser [mailto:phauser@mchsi.com]
Sent: Wednesday, April 30, 2014 8:06 PM
To: Regimbal, Gregg (MDA)
Subject: MDA scoping of neonicotinoid review

April 30, 2014

Gregg Regimball
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

Dear Mr. Regimbal,

RE: MDA scoping of neonicotinoid review

I have lived in Minnesota all of my 71 years but have had the privilege of traveling widely. I have been on every continent except Antarctica and am saving to go there. I am a retired Minneapolis public school teacher, inner city and outer ring. I have camped in all kinds of climates in all kinds of weather on all kinds of land and have thus come to appreciate the balance that is in nature. We don't have to "improve" nature. We'll never "control" nature. We truly need to live in harmony with nature and respect it. Neonicotinoids and systemic pesticides are not in harmony with nature.

Good grief! What ever happened to IPM (integrated pest managementI)?! Why isn't the MDA known for its support of this best practices process of dealing with crop harming insects?

Prophylactic insect control should be banned in MN for the health reasons of *all*--humans, animals and beneficial insects. Using any systemic pesticide, and in this case any neonicotinoid pesticide, flies in the face of IPM with the potential of making the situation worse instead of better with (as you say yourself in your draft) by the *"resurgence of the target pest, replacement by secondary pests, adverse impacts on natural enemies and pollinators, development of pest resistance, and increased costs."* Aren't the "dead zones" in the Mississippi River the result of all the pesticides in the river because of the runoff from all the agriculture? Why aren't you pushing IPM?

Shouldn't the MDA consider banning *all* systemic pesticides? They're god-awful in that they kill each & every insect they come in contact with--all beneficial insects--no discrimination! Bees & butterflies, etc. can't read labels, can't see any difference in a systemic (e.g. neonicotinoid) poisoned flower and one that's not poisoned. And while we're at it, how can you say that any neonicotinoid treated plant is not harmful to humans (mammals) since it means that the fruit or nut or veggie that the neonic treated plant produces also contains some neonic because it's systemic and that's what humans (mammals) eat? Maybe while humans are applying neonics they aren't being affected as much as with some other insecticide, but when they come to eating the fruit created by that plant, aren't they then affected? Low doses maybe, but i'll bet those doses are cumulative and irreversible.

Labels with "Use as directed" is a joke. What about the fools who think if a little is good a whole lot more is even better? And do you really think a "label" is going to protect anyone? Who ever heard of someone being arrested, tried and convicted of the crime of "not following the directions on a label"? Sure, the label can threaten but that's all, almost like a big bluff. Perhaps if someone dies on the spot for being given incorrect medicine then they've been held accountable, but all the poisonous stuff on people's garage shelves? Naw. People do whatever they want with it with impunity. That's why it's so painful to see that all the USEPA is doing is putting out a label. And even that's only on agricultural products not the products the rest of us buy at garden shops, nurseries and the local hardware store. In other words, the USEPA has sold us up the river. Why not, corporations like Bayer, Syngenta and Monsanto make billions with a capital B selling these pesticides world wide and who wants to stand up to those big bulliet of Ag will take them on. You could do it. You are my hope. What you choose to write will make a difference.

Perhaps your proposed scope of neonicotinoid review should include:

1. Reducing, restricting and even banning the use of neonicotinoids. Why shouldn't banning be an option?

2. Requiring the teaching and monetary support for BMPs and IMP for farmers and gardeners?

3. Monetary and informational support for all certified organic small and moderate sized family farmers who are diversified in their farming produce, not just farming one big monoculture.

4. Breaking up of (or at least not subsidizing) corporate farm giants dedicated to one or two monocultures.

5. Supporting in every way possible small and moderate family farms, community gardens and single home family gardening with training, mentoring and financial support so they learn from the get-go how to live IMP and BMPs instead of relying on pesticides, especially neonicotinoids and any systemics, which should be banned.

6. Making it required that MN farmers and gardeners have access to *untreated* corn, soy bean, canola and sugar beet seeds *at the same price* as the treated seeds (this be the responsibility of the pesticide companies or else they're not allowed to sell their pesticides in MN).

7. *IF you're going to allow some restricted and reduced use of neonicotinoids then maybe MDA should* figure out a way to train every person who applies neonicotinods so they know how to apply it according to the label, so as to cause the least harm to pollinators, water, land, other insects, birds and aquatic life.

8. *IF you're going to allow some restricted and reduced use of neonicotinoids then maybe MDA should* enforce per acre use limits---perhaps through how much is being sold to an

individual. Perhaps through requiring the individual to keep accurate and dated records of when and how much they applied to what field.

9. *IF you're going to allow some restricted and reduced use of neonicotinoids then maybe MDA should* track the neonicotinoid seed treatments. Where are they going? Which farmers are using them? Are those farmers trained in the proper use and are they following them? Are they alerting their neighbor who might have bees on their land as to when they're using the neonicotinoids?

10. *IF you're going to allow some restricted and reduced use of neonicotinoids then maybe MDA should* require a license that restricts users to only those who are certified to have attended classes and passed the exam showing understanding of the potential harm caused by neonicotinoids to pollinators, et al. plus a class on why pollinators are important.

11. *IF you're going to allow some restricted and reduced use of neonicotinoids then maybe MDA should* develop a chart showing accurate (not industry produced) evidence indicating the actual cost of using neonicotinoid seed treatments in Minnesota agriculture (corn, soy, canola, wheat, sugar beets and dry bean) and compare those costs with just how much their crops *consistently* increased its yields and was proven more profitable...or not.

12. Since there is no way to license or control gardeners in their use of these toxic chemicals, consider taking if off the garden, nursery and hardware shelves. For professionally trained and licensed farmers only, not even lawn companies or nurseries allowed to be licensed.

By the way, in your draft, how is it that all of your references refer only to governmental groups? What about the science and research papers of non-governmental groups like:

- the Xerces Society? ***www.xerces.org*** They've been around 40 years?

- the American Bird Conservancy http://www.abcbirds.org/newsandreports/releases/130319.html They've been around 20 years.

- PAN North America (Pesticide Action Network) http://www.panna.org/ They've been around 30 years

- Greenpeace http://www.greenpeace.org/usa/en/campaigns/ They've been around 45 years.

- the Journal of Environmental Immunology and Toxicology 1:1, 3-12; March/Aprill 2013; STM Publishing

Enough. Best wishes in this most important endeavor. Thank you for considering my comments.

Sincerely,
Patricia Hauser

Rick Hansen
State Representative

District 52A
Dakota County

Minnesota House of Representatives

May 2nd, 2014

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
Saint Paul, MN 55155-2538

Dear Mr. Regimbal:

This letter is submitted pursuant to the public comment period for the Minnesota Department of Agriculture's March, 2014, document "Scoping a Review of Neonicotinoid Use, Registration and Insect Pollinator Impacts in Minnesota." I have several concerns, as expressed below.

Registration Decision

The scoping document inexplicably omits a key policy option -- the ability of the Minnesota Department of Agriculture ("the Department") to refuse to approve, or "register", a neonicotinoid pesticide for use in Minnesota.

The legislature explicitly granted the Department this authority so that the Department could take action necessary to protect the state's environment and natural resources. By omitting this potential outcome, the Department has inappropriately limited the scope of the forthcoming special registration review. Surely a complete and adequate review would include a thorough analysis of whether the Department should continue to register the pesticides in question. Only if the Department first provides sufficient justification for continued registration should the document discuss what, if any, actions the Department will take to protect pollinators from registered neonicotinoids.

The scoping document lists several possible outcomes of the anticipated special registration review of neonicotinoids. These potential outcomes include:

> "...clarification of label provisions designed to protect non-target organisms and the environment, enforcement-related education, applicator guidance and social network tools developed to enhance product stewardship, and other measures designed to minimize the impacts of pesticide use on human health and the environment." (p. 4)

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These outcomes appear to be built upon the Department's forgone conclusion that it will continue to register neonicotinoid pesticides. This limits the scope of special registration review outcomes to potential application restrictions and enforcement-education efforts.

A key item is missing from the Department's list of potential outcomes -- refusal to approve or renew the registration for some or all neonicotinoid pesticides.

Although the Department's intent is not entirely clear from the wording of the draft scoping document, the Department may have unwittingly or inadvertently dismissed this option by writing:

> "The scope of these special registration reviews varies depending on the potential education, outreach, and enforcement needs identified by the Department. As such, these reviews are not intended to be redundant of analyses and decisions reached by the United States Environmental Protection Agency (USEPA) during federal registration. Rather, these reviews result in a greater understanding of federal registration concerns and provide a variety of opportunities for action." (p. 4).

Read in the context of the entire scoping document, this statement gives the reader the impression that the Department's hands are tied with regard to whether to authorize the continued use of neonicotinoids in Minnesota. The Department implies that this exercise would not only be redundant, but futile as well. If this were the case -- i.e., if the Department were bound by USEPA's decision whether to authorize the use of a pesticide, then what is the purpose of the state-level registration requirement in Minnesota law?

The legislature did not intend that the Department would simply rubber stamp USEPA's registration decisions for fear of being "redundant". This implicit interpretation of the law is nonsensical and -- more troubling -- at odds with legislative intent. What exactly is the purpose of this "special registration review" if not to review and evaluate the Department's registration decision in light of the latest evidence on "insect pollinator impacts"?

By law, a pesticide may not be used in Minnesota unless it is registered by the Department (§18B.26, subd. 1). Registrations expire and must be renewed annually. The legislature granted the Department the authority to approve, deny, or cancel the registration of any pesticide (§18B.26, subd. 5). As a result, although the USEPA may register a pesticide, under state law the Department can prohibit its use in Minnesota.

If the Department chooses to register a pesticide, the Department is empowered to "impose state use and distribution restrictions on a pesticide as part of the registration to prevent unreasonable adverse effects on the environment." (ibid) The scoping document reflects (to some extent) the "restrictions" element of the statute, but omits the denial/cancellation option.

An adequate scoping document and special review would identify all potential options, not only those least likely to upset affected industries. Why allocate scarce public resources to a scoping effort or special registration review that ignores a significant and lawful potential outcome? This is a failure of due diligence. The citizens of Minnesota deserve a full and thorough analysis of neonicotinoids and the Department's legal duty to protect pollinators and the environment at large. The final scoping document and the special registration review must fully explore all options at the Department's disposal, or this effort will be a waste of time and public money.

Use Restrictions

As described above, state law vests the Department with the authority to impose pesticide use and distribution restrictions in order to prevent unreasonable adverse environmental impacts. This includes restrictions on a registered pesticide's application methods, timing, rate, target pests, etc. The potential review outcomes identified by the Department in the scoping document do not fully reflect the Department's authority in this area. Instead, the potential outcomes are focused on label clarification and education efforts. While these are important activities that should be part of the solution, the final scoping document and the registration review itself must emphasize and explore the Department's options and recommendations in the statutorily-authorized area of state-level pesticide use and distribution restrictions. Effective restrictions could protect pollinators from unreasonable harm attributable to specific, high-risk neonicotinoid application practices.

The Department is uniquely positioned to identify problematic neonicotinoid practices and enforce appropriate restrictions. If the Department fails to uphold this duty, its inaction will justifiable draw into question the Department's ability to sufficiently administer state and federal pesticide control laws.

Process

To date, the Department has provided inadequate opportunity for public involvement in the neonicotinoid special registration review process.

On March 3, 2014, the Department announced via the State Register and the Department's pesticide-non-point-source e-mail listserv the availability of the draft scoping document for public review and comment. To my knowledge the Department took no additional action to notify the public. While the pesticide industry, agricultural organizations, and other vested stakeholders are accustomed to reviewing the State Register and likely are members of the Department's listserv, the general public is not.

At a minimum, the Department should develop and publicize a listserv for the neonicotinoid special registration review. The general public could use this dedicated service to follow and actively participate in the process. In addition, the Department should hold and sufficiently publicize public meetings around the state so that interested

parties beyond the Department's usual list of stakeholders can provide input. The Department need look no further than other state entities for best practices in this area, including the Minnesota Department of Natural Resources' critical area rulemaking process and the meetings of the Lessard-Sams Outdoor Heritage Council.

The Department cannot perform a full and adequate special registration review without the opportunity for true public participation. The impacts that neonicotinoid pesticides have on pollinators affect all Minnesotans.

Sincerely,

Rick Hansen

Phyllis Kahn

Joe Atkins

Diane Loeffler

John Benson

Carlos Mariani

Jim Davnie

John Persell

Alice Hausman

Linda Slocum

Debra Hilstrom

Jean Wagenius

Frank Hornstein

Raymond Dehn

Sheldon Johnson

Gregg Regimbal
May 2, 2014

From:	Ryan Drum
To:	Regimbal, Gregg (MDA)
Cc:	rep.cindy.pugh@house.mn; sen.david.osmek@senate.mn
Subject:	Re: MDA Review of Neonicotinoid Insecticides (Comments)
Date:	Friday, May 02, 2014 4:10:39 PM

Gregg Regimbal
Pesticide and Fertilizer Management Division
Minnesota Department of Agriculture
625 Robert Street North
St. Paul, MN 55155-2538

Dear Mr. Regimbal,

Thank you for the opportunity to comment on Minnesota Deptartment of Agriculture's impending "Review of Neonicotinoid Pesticide Use, Registration, and Pollinator Impacts in Minnesota". I, Ryan Drum, am a professional wildlife biologist, though I write to you as a Minnesota citizen with deep concerns about this issue.

Please consider the following comments as you commence the review process:

Neonicotinoid pesticides have become ubiquitous throughout our agricultural landscapes. Many farmers and other consumers, along with the general public, are unaware of the pervasiveness/persistence of these toxins and their associated risks; products are not clearly labeled as containing a "neonicotinoid insecticide", nor are alternative products readily available in many cases.

The widespread use of neonicotinoid insecticides has far out-paced increasingly alarming research findings documenting clear ecological risks (*please see the detailed list of scientific peer-reviewed articles following my comments*). Further troubling, in most cases the practical and/or economic benefits of neonicotinoids are largely unproven (or demonstrated to be worthless). Farmers and general consumers are often unaware of these pesticides (simply labeled as containing Clothianidin, Imidacloprid, Thiamethoxam, etc.) being incorporated into products that include live plants, nearly all conventional corn seed and approximately half of all soybean seeds, as well as a wide array of loosely regulated home-use pesticides. Users are generally unaware of how these chemicals infiltrate and persist in the environment and are unaware of the many associated risks. Furthermore, they are often not provided with neonicotinoid-free product alternatives.

It has been well-documented that neonicotinoids—absorbed within living plants, coated on seeds, persisting within pollen, soil and water—are directly toxic to bees and other insects, specifically designed to leave them vulnerable to pathogens. Additional research is needed to document the ecological and human health risks of neonicotinoid insecticides.

The risks associated with neonicotinoid insecticides to pollinators are increasingly well-documented and truly alarming (see attached citations), as is the pervasiveness of the problem; a product designed to directly disrupt the neurological system of insects does just that. What is less clear is how extensive these products infiltrate throughout our hydrologic systems, vegetative communities, how dramatically they impact pollinator ecosystem functions, amphibians and insectivorous birds and bats, and broader ecosystem functions. Additionally, more information is needed to understand how repeated long-term exposure at various levels impacts fish and wildlife, insect populations, human health, and overall ecosystem integrity.

A full review of the scientific literature is beyond the scope of my comments, however even a brief literature review (see below) will indicate that repeated long-term exposure to these pesticides is very concerning for a wide array of biological organisms, including humans. Exposure in agricultural landscapes has reached epidemic proportions. Furthermore, concentrations in wetlands throughout the agricultural regions of the US (and Canada) have been found to greatly exceed acceptable standards for toxicity in many locations (Anon et al. 2013), standards which may already be far too lenient (Mineau 2013).

The risks extend well beyond bees and other pollinators; neonicotinoid pesticides exposure poses serious risk for fishs, amphibians, birds, bats, humans, and all aspects of ecosystem functions influenced by pollinators and the many fish and wildlife species that feed on insects; these impacts should be incorporated as part of your review.

In addition to widespread bee declines, spatial and population trends in federally endangered insect species-- such as the Dakota Skipper and Poweshiek Skipperling--have been found to directly mirror the widespread spatial patterns of expanding agricultural application of neonicotinoid pesticides, as has occurred over the last approximately 15 years (Williams 2014). Additionally, downward trends for declining grassland bird populations and a wide array of insectivores (including fish, birds, and bats) show similar troubling patterns in direct correlation with the increasingly prevalent use of neonicotinoids throughout Midwestern agricultural landscapes over the past 15-20 years (Mason et al. 2013, Mineau 2013, Mineau and Whiteside 2013, Williams 2014).

These chemicals are designed and advertised to directly disrupt the immune system response of insects. For example, one chemical is touted as “making termites 10,000 times more susceptible to pathogenic soil fungi”. Given the non-targeted exposure to insects in our environment, this is particularly troubling. In addition to bee colony collapse problems increasingly associated with various pathogens, researchers have found evidence of immune system compromise in amphibians and bat species that appear to be associated with neonicotinoid insecticide exposure; recent research suggests there may also be a connection to White Nose Syndrome currently devastating bat colonies throughout the United States (Mason et al. 2013).

These landscape-scale threats extend ecosystem wide, including human food systems and ultimately our national and global economy. Such risks should be taken very seriously and incurred willingly only with great deliberation.

Any perceived benefits of neonicotinoids should be evaluated in the context of their costs and risks, both direct and ecosystem-wide.

Despite ubiquitous application to convention agricultural seed, the associated benefits of neonicotinoid insecticides for farmers are widely unproven, while their risks are increasingly well-documented. McCornack and Ragsdale (2006) found the application of neonicotinoids in Minnesota "did not consistently increase profit or yield" and a 2014 evaluation of 19 peer-reviewed studies, conducted by the Center for Food Safety, documents a growing body of independent scientific evidence showing that neonicotinoids—now pre-coated on nearly all corn seed planted the Midwest—"rarely improve crop yields" (Stevens and Jenkins 2014). Conventional farmers are now largely unable to attain crop seed not already coated with neonicotinoid insecticides.

The US Department of Agriculture estimates approximately 10 million bee hives have been lost since 2006, representing a cost of approximately $2 billion to bee keepers; between 2012-13 the loss of honey production was estimated at $38 million—most of which has occurred in the US Corn Belt region where neonicotinoid insecticides are increasingly prevalent. With US pollinator services estimated to support upwards of $30 billion of the global economy—*while many would claim these services, which are integral to the ongoing sustainability of agricultural and natural ecosystems, are absolutely priceless to our very existence on Earth*—this is a serious threat that should not be taken lightly.

The systematic risks associated with these products need to be more clearly documented, their benefits more clearly proven. Benefits of neonicotinoid products should be further evaluated in the context of their (direct and indirect) costs and risks at multiple scales. Until such cost-benefit analyses are complete, greater regulation and enforcement of standards is clearly warranted.

Farmers and consumers should be better informed about the environmental risks; products should be clearly labeled. Farmers and consumers should be ensured choices for common agricultural commodities and household plants that are neonicotinoid–free.

The increasing variety of neonicotinoid insecticides makes it difficult for most consumers to understand what products fall into this class of pesticides. It is usually unclear if users will truly benefit from the use of these products, and the associated costs/risks are poorly understood by the average user and rarely communicated by the industry.

Standards previously established by the Environmental Protection Agency have been criticized as scientifically unsound and may place aquatic and terrestrial systems at high risk to severe systematic consequences (Mineau 2013); standards should be reviewed and

closely scrutinized to ensure safety and long-term ecosystem functionality.

Federal EPA standards do not effectively incorporate irreversible binding or persistent system accumulations over time (Mineau 2013) and several studies suggest the standards established within the US and Canada far exceed toxicity levels for many organisms, including aquatic invertebrates and amphibians (Beketov et al. 2008, Phong 2009, Wang et al. 2013, etc.). Much more attention is needed to establish safe standards for these chemicals over space and time.

The use of neonictinoid pesticides should be more tightly regulated (and clearly labeled) to ensure ecosystem integrity and human well-being.

The sole responsibility for regulating these toxic chemicals for the public good rests on various levels of government. Urgent action is needed. Regulation, combined with clear labeling standards, will help to mitigate future impacts of these toxins and reduce persistent levels existing in our environment.

The use of neonicotinoid pesticides should be banned on state-owned lands unless authorized by permit, as necessary.

Acknowledging the risks and limited benefits associated with these toxic chemicals, state agencies should consider banning their use entirely unless permitted for explicit problems for which other alternatives have been considered.

The existence of neonicotinoids throughout the soil and hydrologic system should be widely monitored by the MN Pollution Control Agency and/or the MN Department of Agriculture— to better understand the extent of the problem, to allow for important future research in understanding the influence of these pesticides over time, and to enable enforcement of strict limits of neonicotinoid chemicals in soil and water. Enforcement should be proactive and will be critical to ensuring an effective response throughout the region.

The Minnesota Department of Agriculture should be commended for their renewed and focused consideration of neonicotinoid pesticides. Given the predominance of agriculture in Minnesota, and the importance of our shared water resources and wildlife Trust responsibilities, such a critical evaluation is clearly warranted. Much work remains to be done to establish reasonable standards, educate the public, communicate policies, and enforce standards.

It would seem, currently, that a very small minority (predominantly the corporations manufacturing/distributing neonicotinoid insecticides) are benefiting from their widespread use (and lack of strict regulation/enforcement), while great risks and long-term costs are being incurred by the public and our shared natural resources at alarming levels that deserve critical scrutiny and a swift response. I truly hope to see this change in the near

future.

Thank you for the opportunity to provide input on this topic of great importance. I encourage you to closely review the references included below as part of the official review.

Sincerely,

Ryan Drum

Excelsior, MN

(608) 334-9291

References:

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From: Sandra Shanley [mailto:sandrashanley@comcast.net]
Sent: Thursday, May 01, 2014 1:35 PM
To: Regimbal, Gregg (MDA)
Subject: Comment: MDA scoping of neonicotinoid review

May 1, 2014

Gregg Regimbal

Pesticide and Fertilizer Management Division

Minnesota Department of Agriculture

625 Robert Street North

St. Paul, MN 55155-2538

Dear Mr. Regimbal,

RE: MDA scoping of neonicotinoid review

[Introduce yourself or your organization. Are you a gardener, beekeeper, farmer, etc.? If an organization, how many members, and who are they? Why are you concerned about bees

I want the best for Minnesota, and for those who live, work, raise crops and animals here.

Minnesotans need to have current, accurate information on theproblems/ benefits of neonicotinnoid herbicides and pesticides.
I am a retired librarian who grew up on farms in Iowa and Minnesota.
My concern today is that neonicotinnic herbicides/pesticides have become ubiquitous in our environment, but we don't know how they affect our environment, specifically pollinators.
I suggest we safe-guard and protect our plants and animals. They are what sustain and support us.
MDA should review and track the use of neonicotinnoids, and consider recommending untreated seeds and plants;

I also suggest, reducing or restricting the use and quantity of of neonicotinnoid insecticides in our soil, air and water.
We must not use systemic products like neo-nicotinnoids which can cause permanent harm.

I applaud the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Historically, Minnesota has ranked in the top 5 honey-producing states in the nation. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through common-sense action to protect bees from neonicotinoids.

In addition to the proposed scope of MDA's review of neonicotinoids,

I recommend the following additions:

1. As part of a review of neonicotinoids, MDA should investigate options for **reducing and restricting the use of neonicotinoid insecticides**—and, hence, the risk of pollinator exposure. Minnesota policy-makers and the public would benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.

May 2nd, 2014

Gregg Regimbal
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Saint Paul, MN 55155-2538
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Re: Syngenta Crop Protection, LLC comments on "Scoping a Review of Neonicotinoid Use, Registration and Insect Pollinator Impacts in Minnesota".

Syngenta would like to thank the Minnesota Department of Agriculture (MDA) for the opportunity to comment on the "Scoping a Review of Neonicotinoid Use Registration and Insect Pollinator Impacts in Minnesota" document, published March 3rd in the State Register.

The executive summary of the MDA's scoping document outlines the objective and purpose of the review as well as some specific areas that will be explored in the course of its completion. The scoping document makes it clear that "these reviews are not intended to be redundant of analyses and decisions reached by the US EPA during federal registration". Syngenta understands the objectives and purpose of the MDA's review and the importance of collaborating with US EPA during their comprehensive registration review. Any effort to advance the scientific understanding, improve communications and advance stewardship principles in this area are clearly welcomed by Syngenta.

There is currently extensive work underway by US EPA, USDA and others to better understand the complex set of factors which currently affect pollinator health. Neonicotinoids are currently under registration review at US EPA. US EPA has also initiated new study guidance protocols for pollinator testing, and has updated required label language for pollinator protection. In addition, the US EPA in conjunction with the Canada PMRA and California DPR have implemented a new comprehensive risk assessment process for bees.

As outlined in the MDA document, pollinators and pollination services are an extremely important part of production agriculture. Producers have worked cooperatively with apiarists for many decades utilizing pollination services and providing access to agricultural land for forage. This cooperation will continue to provide opportunities for communication, education and the utilization of best management practices to ensure the protection of pollinator health. Agricultural producers have a need for effective pest management tools to protect their crop from yield robbing pests and labeled uses of neonicotinoid insecticides have proven to be a safe and effective tool in many of today's most important crops.

In our comments below, Syngenta is providing information on the benefits and use of neonicotinoids in Minnesota, stewardship and research initiatives. In addition, we stand ready to provide additional data and information that may be requested by MDA during the review.

Syngenta would also like to respond to a few specific items stated in the MDA document. The responses are listed in Table 1.

Table 1.

Statement	Syngenta Response
Page 8 – "A single application can provide protection for several months or years."	This statement is true for control of the emerald ash borer (an invasive species), as a tree injection or soil drench. For most uses, the neonicotinoid control duration is shorter and these data can be made available.
Page 9 – "Use of neonicotinoids in seed treatments in absence of specific identified pest burden may lead to resurgence of the target pest, replacement by secondary pests, adverse impacts on natural enemies and pollinators, development of pest resistance, and increased costs."	Neonicotinoids are a key component of resistance management as noted on Page 11. Furthermore, resistance management is a critical component of IPM programs. In comparison to the older insecticides, neonicotinoids are less harmful to beneficial arthropods and fit well into an IPM program. The residual activity of neonicotinoids used as seed treatments eliminate the need for multiple foliar applications later thereby reducing surface exposure as well as increasing the growers return on investment.
Page 9 – "however, their potential long term, population-level effects on insect pollinators – including honey bees – are uncertain."	A 4-yr Syngenta corn and oil seed rape study assessing the use of thiamethoxam seed treatments on honey bee health in Europe demonstrated no long term negative effect from seed treatment uses[1]
Page 9 – "…direct consumption of neonicotinoid treated seeds may expose birds and other taxa to acute or chronic doses."	Syngenta's review of available databases had no reports of bird incidents related to thiamethoxam seed treatment.
Page 9 – "There is also little information on the actual concentrations of neonicotinoids found in pollen and nectar of treated crops,..."	Several studies with information in this area have been previously submitted to EPA on thiamethoxam (Table 3). We are also attaching a recent summary of published literature on neonicotinoid plant uptake and bioefficacy. (Attachment 1).

Benefits and Use of Neonicotinoids in Minnesota

Neonicotinoids are highly effective against a broad range of sucking and chewing insect pests including aphids, leafhoppers, beetle larvae (grubs) and adults and flies. When applied as either a seed treatment or by soil application, neonicotinoids are taken up by the plant, move through the xylem and provides below ground (around the seed or tuber) and above ground insect control. When applied as a foliar application, neonicotinoids are locally systemic and will move throughout the leaf in the xylem (see Attachment 1 "Neonicotinoid Plant Uptake and Insect Bioefficacy"). If the insect pressure is sustained over a period of time, additional foliar applications will be needed to protect new plant growth.

[1] Pilling et al. 2014. A four-year field program investigating long-term effects of repeated exposure of honey bee colonies to flowering crops treated with thiamethoxam. PLOS One. 8 (10) e77193 http://www.thecre.com/oira_pd/wp-content/uploads/2013/11/PLOS-One-Syngenta.pdf

In Minnesota (GfK Kynetec data), neonicotinoids are primarily used on corn, potatoes, soybeans, sugar beets and spring wheat. For corn, sugar beets and spring wheat, neonicotinoids are used primarily as seed treatments. In potatoes, the majority of the use is either as a seed treatment or soil application with some foliar uses. In soybeans, the majority of neonicotinoids are used as a seed treatment with some foliar uses. In Table 2, neonicotinoids uses are listed by crops, acres grown, % of acres treated with a neonicotinoid and the key insects controlled.

Table 2. Minnesota – Neonicotinoid Use – Crops and Key Pests

	Three Year Average (2010 - 2012)		
Crop	**Acres Grown Neonicotinoid Use Patterns**	**% Acres Neonicotinoids**	**Key Insects Controlled by Neonicotinoids**
Corn	8,100,000 All Seed Treatment Use	91%	Corn Rootworm, Cutworm, Flea Beetle, Seedcorn Maggot, Seedcorn Beetle, White Grubs, Wireworms
Potatoes	48,340 Majority Seed Treatment/Soil Use Some Foliar Use	87%	Aphids, Colorado Potato Beetle, Flea Beetle, Leafhopper, Potato Psyllid
Soybeans	7,233,330 Majority Seed Treatment Some Foliar Use	37%	Aphids, Bean Leaf Beetle, Flea Beetle, Grubs, Seed Maggot, Wireworm
Sugar Beets	472,000 All Seed Treatment Use	31%	Aphids, Flea Beetles, Leafhoppers, Leafminer, Root Aphid, Root Maggot, White Grubs, Wireworm
Wheat, Spring	1,566,671 All Seed Treatment Use	20%	Aphids, Hessian Fly, Wireworm

Benefits of Seed Treatments

Seed treatments provide the grower with an economical and effective means of protection from early-season insect pests. Seed treatments protect the seed and seedling against early season, below-ground and above-ground pests and diseases. This reduces the need for a grower to apply rescue insecticide treatments or to replant a failed crop. Growers report that they can often plant large acreage crops such as corn and soybeans earlier and more quickly by using treated seed. Early season seed and seedling protection typically results in stronger, more uniform stands, healthier plants and higher crop yield.

Seed treatment is a precise application directly to the seed, which then is planted below the soil surface. This reduces potential off-target exposure and, in most cases, significantly reduces the amount of product needed per acre when compared to broadcast applications across the entire field. The American Seed Trade Association (ASTA) and CropLife Foundation report that seed treatment use reduces soil surface exposure to pesticides by up to 90% compared to in-furrow applications and up to 99%

compared to a surface application.[2] Additionally, the use of polymer seed coatings which bind crop protection products directly to the seed reduces exposure to people who handle and plant the seed.

Additional information on the benefits of seed treatment uses is included in a recent publication by CropLife America (footnote 2). More information relative to the overall benefits of neonicotinoid insecticides (including seed treatment, soil and foliar uses) will be made available to MDA in the course of the review.

Integrated Pest Management (IPM) and Best Practices for Insect Management

IPM Definitions

"Integrated pest management can be defined as the practice of preventing or suppressing damaging populations of insect pests by application of the comprehensive and coordinated integration of multiple control tactics. Tactics are the various control methodologies, e.g., chemical, biological, cultural." (IPM Defined, 2011, E. B. Radcliffe. D. Hutchison & R. E. Cancelado [eds.], Radcliffe's IPM World Textbook, http://ipmworld.umn.edu, University of Minnesota, St. Paul, MN). The U.S. Environmental Protection Agency defines Integrated Pest Management as an "effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment." (http://www.epa.gov/pesticides/factsheets/ipm.htm)

Key Components of an IPM Program

IPM relies on a combination of components that are chosen based on the crop and pests (mites or insects) that are being managed. The key components of an IPM program include pest knowledge and identification; monitoring and scouting; economic threshold level or action threshold level and control measures. Before a control measure is taken, it is essential to know the biology of the pest including when and where it feeds on the crop. This knowledge is acquired by one or more of the following: historical field information, monitoring (light traps, sticky cards or pheromone traps) and field scouting to determine which pests are present and at what level. The economic threshold level or the action threshold level, i.e. the pest population level that will cause economic crop damage, is used to determine if a control measure is warranted.

Best Practices for Insect Management

Cultural practices such as planting dates, crop rotation, variety or hybrid selection, crop or residue destruction are the first lines of defense for insect management. Insecticides, another management tool, are chosen based on value, efficacy, residual activity or length of control and spectrum of control. Another consideration of insecticide choice is compatibility with beneficial arthropods which are essential components of an IPM system.

Timing of insecticide applications are based on local thresholds which includes field history, crop rotation and monitoring and/or scouting. These insecticide application timings along with concomitant application methods are based on two IPM decision models protective IPM and threshold IPM.

[2] http://www.croplifeamerica.org/SeedTreatment.pdf

The protective IPM decision model is associated with at-planting application, either as a seed treatment or soil application. Protective control measures are based on factors such as field history including previous crop and pest pressure. For soil inhabiting insects such as seed corn maggot, wireworm and white grubs, scheduled scouting is not practical because there is no effective treatment once the insects are present (Corn, Integrated Pest Management Program - University of Wisconsin Extension, Cooperative Extension Service, and Crop Scouting Guide, various extension and seed company publications). Additionally, since rescue treatments are not available for soil inhabiting insects, protective control is necessary (various university extension and seed company publications). Therefore, seed treatments are considered an effective IPM pest management strategy.

For early season pests such as Colorado potato beetle in potatoes and bean leaf beetles in soybeans, the protective IPM decision model is based on historical insect pressure. The soil and seed treatment applications help to preserve the beneficial arthropod complex by reducing exposure levels and in many cases, minimize or delay the need for foliar insecticide applications.

The threshold IPM decision model is based on field scouting to assess the beneficial arthropods and insect pests and is tied to the economic threshold level or action threshold levels. This model requires an efficient scouting system to determine when to utilize the foliar applied insecticide as well as follow up visits to determine both initial and residual activity and the need for additional applications.

Syngenta Pollinator Stewardship

Syngenta is committed to working with the US EPA in pollinator label enhancements and best management practices for safe use of our products. Syngenta is also committed to pollinator stewardship and recently launched The Good Growth Plan to help farmers across the world grow more food using fewer resources while protecting nature and improving life for people in rural communities. One of the commitments focuses on biodiversity with the goal of enhancing biodiversity on 12 million acres of farmland. Biodiversity is enhanced by creating habitat which provides shelter and food resources necessary for wildlife to flourish. Habitat enhancement is also a key aspect of improving pollinator health.

The Syngenta pollinator stewardship approach consists of two major areas. The first area addresses best management practices (BMPs) and stewardship of our products as it relates to bee protection. The second area addresses pollinator health via improving pollinator habitats and the concomitant increase in pollinator resources.

Syngenta also recognizes that communications between producers of agricultural crops, applicators and apiarists is critical in any effective stewardship plan designed for the protection of pollinators. Syngenta and several industry members partnered with Purdue University in the development of the DriftWatch™ program. This voluntary tool helps to facilitate communication between crop producers, beekeepers, and pesticide applicators. This program has proven to be an effective tool in many states. The Minnesota Department of Agriculture has launched its own DriftWatch™ website and the program should continue to be promoted as a component of effective stewardship and as a best practice for pollinator protection.

Syngenta Seed Treatment

Syngenta has developed and implemented BMPs relative to bee health, for seed applied insecticides based on The Guide to Seed Treatment Stewardship, (www.seed-treatment-guide.com) which was a collaborative effort between CropLife America (CLA) and the American Seed Trade Association (ASTA). The Seed Treatment Guide serves as an educational resource to product users and encourages the voluntarily development and implementation of stewardship practices related to the use of seed treatments and treated seed. The key components of the BMPs are communication and outreach, seed

handling and storage, planting practices, equipment considerations, spill and equipment clean-up and seed and waste disposal.

Syngenta Foliar Applied Thiamethoxam Products

Syngenta has added the new US EPA pollinator protection advisory box and use restrictions to foliar applied thiamethoxam containing products, including mixtures with other insecticides. In addition to product label language for bees, Syngenta utilizes pollinator protection language on company literature and presentations. There is also on-going education with Syngenta technical personnel, field sales and customers.

National Pesticide Safety Education Initiatives and Resources

Syngenta has a leadership role in four national pesticide safety education initiatives and in developing and distributing nine national pesticide safety education resources. All of these impact pollinator protection through life-cycle stewardship of all companies' pesticide products.

Operation Pollinator – Improving Pollinator Habitat

Operator Pollinator (www.operationpollinator.com) is a global initiative created by Syngenta with the goal to restore pollinator populations in agricultural and public landscapes by working to create specific habitats, tailored to local conditions and native pollinators. Farmers and golf course managers in Europe and the USA are provided with targeted seed mixtures and agronomic advice designed to benefit pollinators. Operation Pollinator is supported by a large number of partners, including universities, farmer organizations, NGOs, beekeeping associations, governmental bodies and food producers. The Operation Pollinator program is based on scientific research evaluating seed mixtures relative to plant growth habits and pollinator preferences.

In the United States, Operation Pollinator research has been conducted by cooperators at the University of California, Davis, University of Florida and Michigan State University for agricultural based solutions and the University of Kentucky for golf course based solutions. The science-based solutions for pollinator habitat are offered via cost-sharing for growers and collaboration with industry stakeholders for region-specific seed mixtures. Through Operation Pollinator, growers take a sustainable approach to biodiversity on agricultural land while maintaining productivity; golf course managers advance sustainable course management while improving the natural habitat for pollinators.

In addition to Operation Pollinator, Syngenta is working with a number of external collaborators to restore and increase pollinator habitats. These partners include Project Apis m, Conservation Technology Information Center, Delta F.A.R.M and Trees Forever.

Please see Attachment 2 "Syngenta Pollinator Health/Stewardship" with additional information on our stewardship initiatives.

Summary of Research and Field Studies

Below, please find a partial listing of studies that have been submitted to USEPA (Table 3). In addition a partial listing of on-going studies is provided. While some of these studies are not directly associated with crops grown in Minnesota, it provides MDA with information about the large body of research on thiamethoxam in the area of pollinator protection. The results of this work will be reviewed by US EPA as a part of their registration review of the neonicotinoid class of insecticides.

Table 3 Partial Listing of Studies Submitted to US EPA

STUDY DESCRIPTION	US EPA MRID #
Thiamethoxam (A9765N) – Magnitude of the Residues in Whole Flowers, Leaves, and Reproductive Organ Tissues (Structures) of Soybean from Plants Grown from Cruiser 5FS-Treated Seed	49210901
Two Field Trials to Determine the Effects of HELIX Seed Treatment on Honeybees Foraging on Canola Flowers	49158901
Thiamethoxam (CGA293343) - A Field Study with A9700B + A9638A Treated Maize Seed, Investigating Effects on Honeybees (Apis mellifera L.) over Four Years in Southern France	49158902
Thiamethoxam (CGA293343) - A Field Study with A9700B + A9638A Treated Maize Seed, Investigating Effects on Honeybees (Apis mellifera L.) over Four Years in Lorraine (France)	49158903
Thiamethoxam WG (9584C) - A Semi-Field Study to Evaluate Effects on the Honeybee (Apis mellifera; Hymenoptera, Apidae) in Melon in Italy	49158904
Thiamethoxam WG (A9584C)- A Field Study to Evaluate Effects on the Honeybee (Apis mellifera; Hymenoptera, Apidae) in Peach in Italy	49158905
Residue Study with Thiamethoxam (CGA293343) in or on Sunflower in North of France	49158906
Determination of Analytes Thiamethoxam (CGA293343) and CGA322704 in Oil Seed Rape (Flowers), Honey, Honey Stomach Content and Pollen	49158907
Determination of Analytes Thiamethoxam (CGA293343) and CGA322704 in Winter Rape (Leaves, Blossoms), Honey, Honey Stomach Content and Pollen	49158908
Determination of Analytes Thiamethoxam (CGA293343) and CGA322704 in Sun Flower (Heads), Honey and Pollen	49158909
Determination of Analytes Thiamethoxam (CGA293343) and CGA322704 in Rape (Flowers, Honey, Pollen) and Bee Honey Stomach	49158910
Thiamethoxam (CGA293343) - A Field Study with A9700B + A9638A Treated Maize Seed, Investigating Effects on Honeybee (Apis mellifera L.) over Four Years in Southern France	49158911
Thiamethoxam (CGA293343) - A Field Study with A9700B + A9638A Treated Maize Seed, Investigating Effects on Honeybees (Apis mellifera L.) over Four Years in Lorraine (France)	49158912
Thiamethoxam - Thiamethoxam (CGA293343) - A Field Study with A9700B + A9638A Treated Maize Seed, Investigating Effects on Honeybees (Apis mellifera L.) over Four Years in Alsace (France)	49158913

Thiamethoxam (CGA293343) and its Metabolite (CGA322704) -A Residue Study with A 10590C Treated Maize Seed Investigating Residues in Crop, Soil and Honeybee Products in Southern France	49158914
Thiamethoxam (CGA293343) and its Metabolite (CGA322704) -A Residue Study with A10590C Treated Maize Seed Investigating Residues in Crop, Soil and Honeybee Products in Northern France	49158915
Thiamethoxam (CGA293343) and its Metabolite (CGA322704) - A Residue Study with A10590C Treated Maize Seed, Investigating Residues in Crop, Soil and Honeybee Products in Alsace, France	49158916
Thiamethoxam (CGA293343) and its Metabolite (CGA322704) - A Residue Study with A9807C Treated Winter Oil-Seed Rape Seed, Investigating Residues in Crop and Honeybee Products in Southern France	49158917
Thiamethoxam (CGA293343) and its Metabolite (CGA322704) - A Residue Study with A9807C Treated Winter Oil-Seed Rape Seed, Investigating Residues in Crop and Honeybee Products in Northern France	49158918
Thiamethoxam (CGA293343) and its Metabolite (CGA322704) - A Residue Study with A9807C Treated Winter Oil-Seed Rape Seed, Investigating Residues in Crop and Honeybee Products in Alsace (France)	49158919
Thiamethoxam (CGA293343) - A Semi-Field Study with A97008 + A9638A Treated Maize Seed, Followed By Untreated Flowering Crop(s), Investigating Residues in Crop(s), Soil and Honeybee Products in Alsace (France)	49158920
Thiamethoxam - Residue Analytical Method (GRM009.08A) for the Determination of Residues of Thiamethoxam in Samples from Dust Deposition Trials	49158921
Uptake, Distribution and Metabolisation of CGA293343 in Cucumber Plants Following Different Soil Application Methods	49210201
Uptake, Distribution and Metabolisation of CGA293343 in Tomato Plants Following Different Soil Application Methods	49210202
Uptake and Metabolisation of Thiamethoxam in Cotton, Tomato and Cucumber Following Drench Application	49210203
Uptake and Metabolism of Actara 25 WG in Cotton Following Foliar Application	49210204
Uptake, Metabolism and Distribution of Cruiser 70 WS in Cotton Following Seed Treatment under Normal Humid Soil Conditions	49210205
Uptake and Distribution of CGA293343 Following Seed Treatment in Summer-Rape (Brassica campestris) under Outdoor Conditions	49210206
Uptake and Distribution of CGA293343 Following Seed Treatment in Winter-Rape (Brassica napus) under Outdoor Conditions	49210207

Uptake, Metabolisation and Translocation of CGA293343 in Rape Following Seed Treatment	49210208
Thiamethoxam (A9584C+A 136238 / A9549C+A13623B) Investigation of the Magnitude of Residues of Thiamethoxam (CGA293343) and Metabolite (CGA322704) in Nectar and Pollen of Citrus Flowers. Brazil	49346601
Thiamethoxam- Acute Toxicity to Larval Honey Bees (Apis mellifera)	49346602
Thiamethoxam - Assessment of Subchronic Effects to the Honey Bee Apis mellifera L .. in a 10-Day Laboratory Feeding Test	49346603
Thiamethoxam 25 WG - Toxicity of Residues on Folliage to Honey Bees , Apis mellifera	49346604
CGA293343 – Honey Bee Field Investigation of Actara Pre-Bloom Use in Bartlett Pears.	48584701
Thiamethoxam (CGA293343)- A Field Study with A9807C Treated Winter Oilseed Rape Seed, Investigating Effects on Honeybees (Apis mellifera L.) over Four Years in Northern France).	48053301
Thiamethoxam (CGA293343)- A Field Study with A9807C Treated Winter Oilseed Rape Seed, Investigating Effects on Honeybees (Apris mellifera L.) over Four Years in Alsace (France).	48053302
Field Test: Side Effects of Sunflower Grown from Seeds Dressed with A-9700 B on the Honey Bee (Apis mellifera L.) in Argentina.	46241601
Field Test: Side Effects of Sunflowers Grown from Seeds Dressed with CGA293343 350 FS (A-9700 B) on the Honeybee (Apis mellifera carnica)	46163102
Evaluation of the Use of Cruiser (thiamethoxam CGA 293343) Seed Treatment Use on Sunflower to Honey Bees	46163103
Determination of Analytes Thiamethoxam (CGA 293343) and its Metabolite CGA 322704 in or on Pollen, Nectar and Honey from Sunflower Collected in Study 991567	46163104
Report on Analytical Study 106/00. Determination of Analytes Thiamethoxam (CGA 293343) and CGA 322704 in Sun Flower (Heads and Flowers), Honey, Nectar, and Pollen Collected in Study 31061/00.	46163105
Report on Analytical Study 107/00. Determination of Analytes Thiamethoxam (CGA 293343) and CGA 322704 in Sunflowers (Heads and Flowers), Honey, Nectar, and Pollen Collected in Study 31062/00.	46163106
Report on Analytical Study 104/00. Determination of Analytes Thiamethoxam (CGA 293343) and CGA 322704 in Sunflower (Heads and Leafs), Honey, Pollen, and Bee (Honey Stomach Content) Collected in Study 99332/S1-BFEU.	46163107
Report on Analytical Study 103/01. Determination of Analytes Thiamethoxam (CGA 293343) and CGA 322704 in Sunflowers (Flowers, Leaves), Honey, Honey Stomach Content and Pollen, Collected in Study 20001072/II-BFEU.	46163108
CGA-293343: A Foliage Residue Toxicity Study with the Honey Bee.	44727501
Testing Toxicity to Honeybee – APIS Mellifera L. with CGA-293343.	44714927
Honey Bee Field Investigation of Mitigation Methods for CGA-293343 25WG (A-9584-C) Use in Apple Orchards; WA State Univ 98-001.	44714929

On-going Pollen and Nectar Residue Studies with Thiamethoxam

CA Tomato – soil application in 2 consecutive years

CA Cucumber – soil application in 2 consecutive years

CAN Canola – treated seeds planted in the same fields in 2 consecutive years

CA Citrus (2012 - 2015) – Soil application, 2 different studies

FL Citrus (2012 - 2015) – Soil application

CA Cotton (2013 - 2015) - foliar and seed treatment application

CA Stone Fruit (2013 - 2015) – Foliar application

CA Strawberry (2014 - 2016) – Foliar application

CAN Potato – Canola (2013 – 2014) – Soil application

Planned Pollen and Nectar Studies

All studies will be conducted in 3 locations within the US or Canada

Soil applications – peppers, melons, tomatillos, ground cherries, pumpkins and gourds

Seed treatment – peas and black-eyed peas

Foliar applications – cucumbers, cranberries, tomatoes, grapes

Seed Treatment Dust Research

IA dust study (2013 – 2014) - To evaluate deflectors and an alternative lubricant to graphite and talc in mitigating dust released from pneumatic planter exhaust and the potential for offsite transport.

Corn Dust Research Consortium (CDRC) (2013 – 2014) – To evaluate an alternative lubricant to graphite and talc in reducing dust released from pneumatic planter exhaust and the potential for off-site transport. This research is also evaluating the foraging habits of honey bees at the time of corn planting.

The success of Syngenta and our customers is heavily dependent on the pollinator health. It is important that all stakeholders better understand the many factors affecting pollinator populations and what can be done to bolster their health. Pollinator stewardship has been, and will continue to be a priority for Syngenta and the agricultural community.

Thanks again for the opportunity to comment on the MDA's scoping document. Please feel free to contact us for any clarification or further information needs.

Sincerely,

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Neonicotinoid Plant Uptake and Insect Bioefficacy

Preliminary list of titles and abstracts of published studies evaluating neonicotinoid plant uptake and insect bioefficacy are shown below. The studies were conducted in laboratory and field conditions on a variety of annual and perennial crops. Application methods included seed treatment, soil drench, soil chemigation and foliar applications. Insect pests evaluated were primarily sucking insects and included cotton aphid (*Aphis gossypii*), green peach aphid (*Myzus persicae*), hop aphid (*Phorodon humuli*), avocado lacewing (*Pseudacysta perseae*), avocado thrips (*Scirtothrips perseae*), Asian citrus psyllid (*Diaphorina citri*), citrus leafminer (*Phyllocnistis citrella*), citrus mealybug (*Planococcus citri*), Western chinch bug (*Blissus occiduus*), glassy-winged sharpshooter (*Homalodisca coagulata*) and silverleaf or sweet potato whitefly (*Bemisia tabaci*). Chewing insects in the studies were Colorado potato beetle (*Leptinotarsa decemlineata*) and rice water weevil (*Lissorhoptrus oryzophilus*).

When applied to and taken up by the plant, neonicotinoids move within the xylem and are translocated acropetally. Although the pattern of uptake and movement of the neonicotinoids are similar, the results of the studies showed that there are significant differences in plant uptake and bioefficacy with a specific neonicotinoid in different crops or ornamentals as well as differences in plant uptake and bioefficacy between different neonicotinoids in the same crop or ornamental. In the studies, there were also noted differences in neonicotinoid concentrations depending on the age of the perennial plant as well as between young leaves and older leaves and these differences had a significant effect in terms of insect control depending on the location of insect feeding. Conclusions from these studies indicate that neonicotinoid physical-chemical properties, plant type and age, soil type, other edaphic factors, and insect interactions must be considered when determining potential insect bioefficacy.

Buchholz, A. and R. Nauen (2002). "Translocation and translaminar bioavailability of two neonicotinoid insecticides after foliar application to cabbage and cotton." Pest Management Science 58(1):10-16.

A laboratory study was undertaken to investigate the leaf systemic properties and the translaminar aphicidal activity of two commercialized neonicotinoid (chloronicotinyl) insecticides. For that purpose [14C]imidacloprid was subjected to uptake and translocation studies in cabbage (*Brassica oleracea* var. sabauda) cv. Fischenicher Advent and cotton (*Gossypium hirsutum*) cv. Stoneville 474 after foliar application. Foliar penetration and short-term translocation patterns of imidacloprid were similar in both plant species. Nevertheless, imidacloprid penetrated twice as much into cabbage leaves as it did into cotton leaves. It showed a comparable translaminar behavior and was entirely translocated acropetally, indicating its well-known xylem mobility. The translaminar and acropetal movement of imidacloprid and acetamiprid were quantified by simple laboratory bioassays using the green peach aphid, *Myzus persicae*, and the cotton aphid, *Aphis gossypii*, as typical homopteran pests for cabbage and cotton, respectively. A single dose (7.5 micro g a.i. per leaf)

applied to the upper leaf surface of cabbage and cotton was tested against aphids feeding on the lower leaf surface both close to and distant from the site of application 1, 5 and 12 days after treatment. The translaminar residual activity of imidacloprid on cabbage leaves was superior to that of acetamiprid, whereas its translaminar efficacy against *A. gossypii* on cotton was inferior to that of acetamiprid. However, oral ingestion bioassays using an artificial double membrane feeding system revealed no significant differences in intrinsic activity between the two neonicotinoids tested.

Byrne, F.J., S.J. Castle, J.L. Bi and N.C. Toscano (2005). "Application of competitive enzyme-linked immunosorbent assay for the quantification of imidacloprid titers in xylem fluid extracted from grapevines." Journal of Economic Entomology 98(1):182-187.

A competitive enzyme-linked immunosorbent assay (ELISA) technique was evaluated for quantifying titers of imidacloprid in xylem fluid extracted from *Vitis vinifera* L. grapevines that were treated with systemic applications of the neonicotinoid insecticide Admire. Evidence of matrix effects, factors that compromise the precision and accuracy of the ELISA, was present in assays with undiluted xylem fluid. These effects could be eliminated by dilution of extracts in water, resulting in a lower sensitivity of the assay of 4 micro g liter-1. In a field trial conducted in a commercial vineyard, there was an excellent correlation between Admire application rates and xylem fluid concentrations of imidacloprid. At an Admire application rate of 1.17 litre ha-1 (16 fl oz per acre), uptake of imidacloprid into vines was rapid. Imidacloprid was consistently detected in the xylem for up to 3 mo after application at concentrations known to be effective at managing populations of the sharpshooter *Homalodisca coagulata* Say, an important vector of *Xylella fastidiosa* Wells in California vineyards. The ELISA is a sensitive technique that can be used to study the behavior of systemic insecticides within crop systems and their impact on pest populations.

Byrne, F.J., E.C. Humeres, A.A. Urena, M.S. Hoddle and J.G. Morse (2010). "Field evaluation of systemic imidacloprid for the management of avocado thrips and avocado lace bug in California avocado groves." Pest Management Science 66(10):1129-1136.

The efficacy of systemic applications of imidacloprid for the management of avocado thrips and avocado lace bug was determined in field trials. Following insecticide treatment by chemigation, leaves of appropriate age for each insect were sampled over a 6 month period and used for bioassays. Imidacloprid residues were measured by ELISA in leaves used for bioassays to determine concentrations of insecticide that were toxic to both pests. RESULTS: The uptake of imidacloprid into treated trees was extremely slow, peaking in the current year's leaf flush at only 8 ng cm-2 leaf tissue after 15 weeks. Avocado thrips mortality in bioassays with young flush leaves, the preferred feeding substrate for this insect, was minimal, indicating that imidacloprid concentrations were below threshold levels needed for effective control. Residues present in older leaves, which are preferred by the avocado lace bug, were higher than in young flush leaves, and provided good control of this pest. Probit analysis of bioassay

data showed that the avocado lace bug (LC50=6.1 ng imidacloprid cm-2 leaf tissue) was more susceptible to imidacloprid than the avocado thrips (LC50=73 ng imidacloprid cm-2 leaf tissue). CONCLUSIONS: In spite of the slow uptake of imidacloprid into avocado trees, the levels of imidacloprid would be sufficient to control avocado lace bug infestations. In contrast, the slow uptake would be problematic for avocado thrips control because inadequate levels of insecticide accumulate in new flush foliage and would allow avocado thrips populations to build to levels that would subsequently damage developing avocado fruit.

Byrne, F.J., R.D. Oetting, J.A. Bethke, C. Green and J. Chamberlin (2010). "Understanding the dynamics of neonicotinoid activity in the management of *Bemisia tabaci* whiteflies on poinsettias." Crop Protection 29(3):260-266.

The relative efficacies of registered label rates for foliar and soil drench treatments of imidacloprid and dinotefuran at preventing the establishment of *Bemisia tabaci* B biotype whitefly populations on newly infested poinsettia plants were evaluated. Pesticide levels within and on plant leaves were monitored for 10 weeks by ELISA and LC/MS in an effort to better understand the dynamics of neonicotinoid activity against this insect and to estimate insecticide concentrations needed to kill the nymphal and adult stages. While all treatments proved equally effective as a remedial measure for the control of the resident adult populations, thereby accomplishing the objective of foliar contact treatments, the dinotefuran soil drench application was the only treatment that provided multi-generational control of *Bemisia* populations.

Byrne, F.J. and N.C. Toscano (2006). "Uptake and persistence of imidacloprid in grapevines treated by chemigation." Crop Protection 25(8):831-834.

The uptake and persistence of a systemic formulation (240 g l-1 SC) of imidacloprid was studied in grapevines treated by chemigation, with the objective of defining suitable application rates for control of the glassy-winged sharpshooter *Homalodisca coagulata* Say. The sharpshooter is an important vector of Pierce's Disease in southern California, and insecticide treatments are necessary for effective management of insect populations and disease transmission. Uptake of imidacloprid was most rapid at the highest rates of application (281 and 562 g ha-1), reaching target threshold levels within the xylem fluid of 10 micro g l-1 within 2 days in younger vines (4 years old). At 141 g ha-1, however, uptake was slow and threshold levels were not achieved in every vine. In older vines (20 years old), 6-8 days elapsed before threshold levels were detected in vines treated with 281 and 562 g ha-1. Despite the initial delay in uptake, once the target threshold was reached, it was maintained throughout the season. It is clear from available information on the population dynamics of the glassy-winged sharpshooter, particularly relating to its seasonal movement from citrus orchards to neighboring vineyards, that appropriate timing of insecticide treatments can play a crucial role in the management of this pest.

Byrne, F.J., N.C. Toscano, A.A. Urena and J.G. Morse (2007). "Toxicity of systemic neonicotinoid insecticides to avocado thrips in nursery avocado trees." Pest Management Science 63(9):860-866.

The efficacies of four systemic neonicotinoid insecticides applied to potted avocado trees at manufacturer-recommended rates were assessed against the avocado thrips, *Scirtothrips perseae* Nakahara. At the time of treatment, fully expanded first-flush young leaves were tagged for identification, and a proportion of these leaves was used in bioassays with second-instar thrips. At 7 weeks post-treatment, a second flush of leaves had fully expanded on the trees, and these leaves were included in additional bioassays comparing avocado thrips mortality on both first- and second-flush leaves. In bioassays with first-flush leaves, imidacloprid (273 mg AI pot-1) was the most effective insecticide, providing at least 70% mortality of thrips for 14 weeks. Thiamethoxam (137 mg AI pot-1), clothianidin (109 mg AI pot-1) and dinotefuran (241 mg AI pot-1) provided good control in bioassays that were conducted within 4 weeks of treatment, but thereafter their efficacies were inconsistent. In bioassays with second-flush leaves, imidacloprid provided at least 70% mortality up to 9 weeks after the insecticide application. Thereafter, mortality declined to 30% or lower. Bioassays with second-flush leaves collected from trees treated with thiamethoxam, clothianidin and dinotefuran resulted in unacceptably low thrips mortality. Monitoring of imidacloprid and thiamethoxam residues by ELISA showed that the greater persistence of imidacloprid in both first and second leaf flushes was due to a steadier uptake of this material. Although thiamethoxam residues rose quickly within the first leaf flush, levels had already begun to dissipate by the time the second leaf flush had started to develop.

Castle, S.J., F.J. Byrne, J.L. Bi and N.C. Toscano (2005). "Spatial and temporal distribution of imidacloprid and thiamethoxam in citrus and impact on Homalodisca coagulata populations." Pest Management Science 61(1):75-84.

Titers of two systemic neonicotinoid insecticides in citrus trees were measured in conjunction with conventional evaluations of their impact on glassy-winged sharpshooter (*Homalodisca coagulata* (Say); GWSS) populations. Xylem fluid samples were collected at regular intervals and from multiple locations within field-grown citrus trees to determine imidacloprid and thiamethoxam concentrations using commercial ELISA kits. Uptake profiles varied considerably with peak mean titers of imidacloprid occurring 6-8 weeks after application compared with 2 weeks for thiamethoxam. The persistence of each compound also varied as near-peak levels of imidacloprid were sustained for another 6-10 weeks before gradually declining. In contrast, thiamethoxam titers declined more rapidly after the initial peak, possibly reflecting an application rate only one-quarter of that used for imidacloprid. Within-tree distributions were more similar for the two compounds, with no significant effect due to height of the sample (upper or lower half) or to the quadrant location within the tree, with the exception of one quadrant in the thiamethoxam-treated trees. Substantial reductions in GWSS nymphs and adults were observed in imidacloprid-treated trees during the 2001 trial and were sustained for 4-5 months after treatment. Treatment effects on nymphs were not as well pronounced in the

2002 trial, when overall GWSS infestations were much reduced from the previous year. However, consistently lower adult infestations were still observed in 2002 for both treatments compared with untreated trees. Information on the spatial and temporal profiles in citrus trees was obtained for both compounds to complement field impact data and improve understanding of their pest management potential.

Castle, S.J. and N. Prabhaker (2013). "Monitoring changes in *Bemisia tabaci* (Hemiptera: Aleyrodidae) susceptibility to neonicotinoid insecticides in Arizona and California." Journal of Economic Entomology 106(3):1404-1413.

Bemisia tabaci (Gennadius) biotype B is a highly prolific and polyphagous whitefly that established in much of North America during the 1980s. Neonicotinoid insecticides have been fundamental in regaining control over outbreak populations of *B. tabaci*, but resistance threatens their sustainability. Susceptibility of *B. tabaci* in the southwestern United States to four neonicotinoid insecticides varied considerably across populations within each year over a 3 yr period. Using a variability ratio of highest LC50 to lowest LC50 in field-collected whitefly adults from Arizona and California, the ranges of LC50s across all tests within compounds were highest to imidacloprid and lowest to thiamethoxam. Patterns of susceptibility were similar among all four neonicotinoid insecticides, but the greater variability in responses to imidacloprid and significantly higher LC50s attained indicated higher resistance levels to imidacloprid in all field populations. Further evidence of differential toxicities of neonicotinoids was observed in multiple tests of dinotefuran against imidacloprid-resistant lab strains that yielded significant differences in the LC50s of dinotefuran and imidacloprid in simultaneous bioassays. To test the possibility that resistance expression in field-collected insects was sometimes masked by stressful conditions, field strains cultured in a greenhouse without insecticide exposure produced significantly higher LC50s to all neonicotinoids compared with LC50s attained directly from the field. In harsh climates such as the American southwest, resistance expression in field-collected test insects may be strongly influenced by environmental stresses such as high temperatures, overcrowding, and declining host plant quality.

Cloyd, R.A., K.A. Williams, F.J. Byrne and K.E. Kemp (2012). "Interactions of light intensity, insecticide concentration, and time on the efficacy of systemic insecticides in suppressing populations of the sweetpotato whitefly (Hemiptera: Aleyrodidae) and the citrus mealybug (Hemiptera: Pseudococcidae)." Journal of Economic Entomology 105(2):505-517.

The impact of light intensity on the uptake and persistence of the systemic neonicotinoid insecticides, imidacloprid and dinotefuran, were evaluated in poinsettia (*Euphorbia pulcherrima* Willd.) and yellow sage (*Lantana camara* L.). Insecticide residues were measured in leaves sampled from the treated plants at four time intervals after treatment to determine the relationship between insecticide concentration and efficacy against two insect pests: sweetpotato whitefly, *Bemisia tabaci* Gennadius, and the citrus mealybug, *Planococcus citri*

Risso. The insecticides were evaluated at their respective label rate and at the comparable label rate of the other insecticide under two different light environments: ambient and shade. The uptake of dinotefuran into yellow sage was more rapid at both treatment rates than both rates of imidacloprid, resulting in higher percent mortality of whitefly nymphs (89.8-100) compared with imidacloprid (14.1-89.2) across all 4 wk. Additionally, plants that received both rates of dinotefuran had fewer whitefly pupae (<1.0) at week 4 compared with imidacloprid-treated plants (23.7-25.3). The uptake of dinotefuran into poinsettia plants was also more rapid and resulted in quicker and higher percent mortality of whitefly nymphs (89.5-99.6) compared with imidacloprid (14.1-89.2) across all 4 wk. However, despite efficient uptake, the efficacy of both systemic insecticides was less for citrus mealybug where percent mortality values were <50% among all the treatments across the 4 wk. The use of the two systemic insecticides evaluated in regards to pest management in horticultural cropping systems is discussed.

Fischer, W. and H. Widmer (2001). Chemodynamic behaviour of the new insecticide thiamethoxam as seed treatment. (BCPC Symposium Proceedings No. 76). In: Proceedings of an international Symposium, Wishaw, North Warwickshire, UK, 26-27 February 2001; 2001. A.J. Biddle, Ed. Farnham: Seed treatment British Crop Protection Council: 203-208.

The neonicotinoid thiamethoxam is a systemic insecticide. It is characterized by a low molecular weight (291.7), a low octanol-water partition coefficient (log Pow : -0.13) and a relatively high water solubility (4100 mg/litre). The physicochemical parameters are favourable for an efficient uptake of the compound into the seed and transport in the xylem. During imbibition due to its high water solubility thiamethoxam is initially taken up into all seed compartments and organs of the seedling at very high concentrations. Thiamethoxam is efficiently taken up by the roots and transported in acropetal direction, it is distributed in the whole plant. Due to its high water solubility, uptake of thiamethoxam is not impaired under dry soil conditions. Thiamethoxam is bioavailable over extended periods of time.

Lanka, S.K., J.A. Ottea, J.A. Davis, A.B. Hernandez and M.J. Stout (2013). "Systemic effects of thiamethoxam and chlorantraniliprole seed treatments on adult *Lissorhoptrus oryzophilus* (Coleoptera: Curculionidae) in rice." Pest Management Science 69(2):250-256.

Feeding assays using adult rice water weevils and foliage of plants treated as seeds with chlorantraniliprole and thiamethoxam at different rates were conducted to evaluate the systemic adulticidal and feeding effects. Dose–mortality relationships were determined for thiamethoxam seed treatments by combining leaf area lost due to feeding and insecticide residues analyzed by LC/MS/MS. Changes in adulticidal activity of thiamethoxam were also investigated by contrasting adult mortalities at the 5–6-leaf and tillering stages of rice. RESULTS: Adult weevil mortalities and leaf consumption rates on foliage were affected in thiamethoxam but not in chlorantraniliprole treatments when rice was at the 6–7-leaf stage. The LD50 for weevils feeding on thiamethoxam-treated rice at the 2–3-leaf stage was 447 pg insecticide weevil−1 (95% CL: 25–830 pg weevil−1) but was lower (142 pg weevil−1; 95% CL:

102–180 pg weevil−1) in experiments with 3–4-leaf-stage plants. Mortalities on leaves from 5–6-leaf-stage plants were consistently higher than on leaves from tillering plants. Thiamethoxam residues measured by ELISA increased with seed treatment rate and differed between plant stages. CONCLUSION: The LD50 values developed in this study are the first values for leaf-feeding insects on foliage of plants treated as seeds with thiamethoxam. The attrition of adulticidal activity of thiamethoxam in foliage of older plants may help to explain the reduced effectiveness of seed treatments against rice water larvae that is seen at later stages of rice growth in field studies. The differential activity of these two seed treatments on adults suggests that adult mortality contributes to the field efficacy of thiamethoxam but not to that of chlorantraniliprole.

Olson, E.R., G.P. Dively and J.O. Nelson (2004). "Bioassay determination of the distribution of imidacloprid in potato plants: implications to resistance development." Journal of Economic Entomology 97(2):614-620.

Soil-applied imidacloprid exhibits exceptional efficacy as a systemic insecticide against the Colorado potato beetle, *Leptinotarsa decemlineata* (Say). An uneven distribution of the chemical within potato plants could result in differential concentrations, which may allow for discrimination between genotypes of varying susceptibility. In this study, susceptible and tolerant larvae were fed leaves from the lower, middle, and upper canopy of treated and untreated plants to characterize within-plant distribution of imidacloprid at 4, 6, 8, 10, 12, and 14 wk after planting. Significant differences in larval mortality and development indicated that the concentration of imidacloprid was unevenly distributed in the potato foliage during 6-14 wk after planting. The concentration of imidacloprid was lowest in the younger tissues of the upper leaves and highest in the older, lower leaves. At 6 wk, a time when the postdiapause beetles are colonizing potato fields, the lower concentration in upper leaves was toxic to susceptible larvae but did not kill a substantial portion of the tolerant larvae. Results suggest that higher concentrations of imidacloprid in the lower canopy leaves may act as a toxic barrier to colonizing susceptible beetles but may allow more tolerant individuals to reach the upper canopy with lower concentrations. Possible scenarios of how different concentrations of the systemic insecticide could influence the rate of resistance development are discussed.

Setamou, M., D. Rodriguez, R. Saldana, G. Schwarzlose, D. Palrang and S.D. Nelson (2010). "Efficacy and uptake of soil-applied imidacloprid in the control of Asian citrus psyllid and a citrus leafminer, two foliar-feeding citrus pests." Journal of Economic Entomology 103(5):1711-1719.

The systemic neonicotinoid insecticide imidacloprid, Admire Pro, was applied to 3- and 4-yr-old nonbearing 'Rio Red' grapefruit, Citrus x paradisi Macfad., trees in 2006 and 2007, respectively, to determine its effects in the control of two major citrus pests, the Asian citrus psyllid, *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae), and a citrus leafminer *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae). Young flush shoots were randomly collected weekly for

13 and 11 wk in 2006 and 2007, respectively, to determine the infestation levels and densities of immature stages of both Asian citrus psyllid and *P. citrella*. Additional flush shoot samples were collected in 2007 and titers of imidacloprid in leaf tissue were determined using an enzyme-linked immunosorbent assay. Soil application of imidacloprid significantly reduced the infestation levels and densities of both pests on flush shoots, starting from the second week post application. The effects of the neonicotinoid insecticide were similar in both years. Analysis of imidacloprid concentration in leaf tissue showed a gradual increase during the first 3 wk, and titers remained well above 200 ppb for 11 wk post application. Significant positive correlations were obtained between imidacloprid titers in leaf tissue and the percentage of control levels achieved for both pests. A high level of suppression of both *P. citrella* and Asian citrus psyllid populations on citrus trees was associated with imidacloprid titer in leaf tissue >200 ppb, which was reached 2 wk after soil treatment. Although soil application of imidacloprid did not provide rapid knockdown of Asian citrus psyllid and *P. citrella* populations, it resulted in chronic residues in leaf tissue and long-term suppression of both pests.

Stamm, M.D., T.M. Heng-Moss, F.P. Baxendale, B.D. Siegfried, R.E. Gaussoin, D.D. Snow and D.A. Cassada (2013). "Effect of distribution and concentration of topically applied neonicotinoid insecticides in buffalograss, *Buchloe dactyloides*, leaf tissues on the differential mortality of *Blissus occiduus* under field conditions." Pest Management Science 69(2):285-291.

Neonicotinoid insecticides are generally efficacious against many turfgrass pests, including several important phloem-feeding insects. However, inconsistencies in control of western chinch bugs, *Blissus occiduus*, have been documented in field efficacy studies. This research investigated the efficacy of three neonicotinoid insecticides (clothianidin, imidacloprid and thiamethoxam) against *B. occiduus* in buffalograss under field conditions and detected statistically significant differences in *B. occiduus* numbers among treatments. A subsequent study documented the relative quantity and degradation rate of these insecticides in buffalograss systemic leaf tissues, using HPLC. RESULTS: Neonicotinoid insecticides initially provided significant reductions in *B. occiduus* numbers, but mortality diminished over the course of the field studies. Furthermore, while all three neonicotinoids were present in the assayed buffalograss leaf tissues, imidacloprid concentrations were significantly higher than those of clothianidin and thiamethoxam. Over the course of the 28 day study, thiamethoxam concentrations declined 700-fold, whereas imidacloprid and clothianidin declined only 70-fold and 60-fold respectively. CONCLUSIONS: Field studies continued to verify inconsistencies in *B. occiduus* control with neonicotinoid insecticides. This is the first study to document the relative concentrations of topically applied neonicotinoid insecticides in buffalograss systemic leaf tissues.

Toscano, N., F. Byrne, S. Castle, M. Learned, B. CropScience, C. Paso Robles, C. Gispert, C. Indio, B. Drake and D. Enterprises (2004). Laboratory and Field Evaluations of Imidacloprid (Admire), Thiamethoxam (Platinum), and Acetamiprid (Assail) Against the Glassy-Winged Sharpshooter. Proceedings, Pierce's Disease Research Symposium. 371-374.

Admire and Platinum applications were compared in Temecula vineyards. Although the uptake and residual persistence of both products was excellent, peak levels of Platinum within the xylem fluid of vines were almost 10-fold higher than Admire levels despite a lower application rate. In studies conducted in vineyards in the Coachella Valley, Admire uptake was considerably less efficient than that measured in Temecula vineyards. This could be rationalized by differences in soil properties between the two regions and the impact of irrigation practices. In soil column studies, Admire was shown to be more mobile in Coachella soils. Uptake was improved in vines that were under a strict irrigation regime that delivered water according to recommended vine requirements. Under these conditions, Admire within the xylem fluid attained recommended levels for GWSS suppression. In a preliminary evaluation of foliar applications of Assail, residues of acetamiprid, the active ingredient of this insecticide, were detected within the xylem fluid. Therefore, foliar applications may prove effective against GWSS both through contact and systemic activity.

Toscano, N., S. Castle, F. Byrne, J. Bi, N. Prabhaker, M. Learned and C. Paso Robles (2002). Laboratory and field evaluations of imidacloprid and thiamethoxam against GWSS on citrus and grapes. Proceedings, Pierce's Disease Research Symposium, San Diego, pp141-142.

By measuring temporal and spatial dynamics of imidacloprid uptake and distribution in mature citrus trees and grapevines, then relating these data to GWSS densities on treated trees and grapevines relative to untreated ones, we have demonstrated the capacity of a single imidacloprid treatment per season to reduce GWSS populations. Questions that initially arose following the first large-scale applications in Temecula in Spring, 2000 concerning the quantity, distribution, and persistence of imidacloprid in citrus trees have now been addressed with the results from our studies. Information that will derive from this project should help optimize future GWSS control efforts.

Weichel, L. and R. Nauen (2004). "Uptake, translocation and bioavailability of imidacloprid in several hop varieties." Pest Management Science 60(5):440-446.

The neonicotinoid insecticide imidacloprid is the most important insecticide in hop cultivation in Germany. A laboratory study was undertaken to investigate its systemic properties and translaminar bioavailability in hop leaves. Radiolabelled [methylene-14C]imidacloprid was applied either alone or in combination with different additives onto leaves of several hop varieties. Uptake and translocation were evaluated 1 and 7 days after foliar application under greenhouse conditions. The uptake of imidacloprid into hop leaves was most pronounced in the first 24 h after application and only negligible amounts were taken up after this period.

Significant differences in the quantitative uptake occurred when imidacloprid was combined with additives, such as Amulsol, Genapol C-100, Hasten and LI 700. The uptake of imidacloprid applied without additives was less than 10% 7 days after application, whereas the combination with LI 700 provided 70-80% uptake. Genapol C-100 and Amulsol induced considerable phytotoxicity at the application site. Comparing hop varieties revealed differences up to twofold in foliar penetration of imidacloprid. The translaminar and acropetal bioavailability of imidacloprid foliarly applied to hop leaves was determined by a laboratory bioassay using the damson hop aphid, *Phorodon humuli* (Schrank). Significantly higher mortality was observed with laboratory formulations containing imidacloprid and the additive LI700. In contrast to these results from systemic tests, contact mortality at the application site was constantly high over the testing period of 7 days, highlighting the importance of this mode of entry for aphid intoxication.

Zhang, L., S.M. Greenberg, Y. Zhang and T.-X. Liu (2011). "Effectiveness of thiamethoxam and imidacloprid seed treatments against *Bemisia tabaci* (Hemiptera: Aleyrodidae) on cotton." Pest Management Science 67(2):226-232.

Bemisia tabaci (Gennadius) biotype B is one of the most important pests on cotton around the world. Laboratory, greenhouse and field experiments were conducted to determine the efficacy of thiamethoxam and imidacloprid seed treatments against B. tabaci on cotton. RESULTS: Under laboratory conditions, the two treatments caused whitefly adult mortality, reduced oviposition and increased mortality of nymphs at 10, 20, 30 and 40 days after germination (DAG). The longer the adults fed on plants from treated seeds, the higher the mortality. The two treatments did not have any effect on eggs. The efficacy of the treated seeds against *B. tabaci* gradually decreased from 10 to 40 DAG, being the lowest at 40 DAG. In laboratory experiments, the efficacies between the two treatments were similar. In greenhouse experiments, the two treatments were equally effective with lower numbers of whiteflies than untreated controls. With both treatments the concentrations of the active ingredient were gradually reduced with aging of the plants and from the bottom to the top leaves of the plants. Numbers of live whiteflies were well correlated with the dosage of active ingredients. Under field conditions, the seeds treated with both insecticides exhibited similar efficacy against *B. tabaci* for up to ~2 months. CONCLUSION: Cotton seeds treated with imidacloprid and thiamethoxam were effective against *B. tabaci* for up to 45 days under laboratory and greenhouse conditions, and up to ~2 months under field conditions. Use of imidacloprid- and thiamethoxam-treated seeds can be an important alternative for management of whiteflies on cotton.

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SYNGENTA POLLINATOR HEALTH /STEWARDSHIP

Habitat and Forage Improvement for Pollinators

Syngenta Operation Pollinator Program

- Syngenta has supported bee health through its **Operation Pollinator** initiative for more than 10 years. Operation Pollinator is a global program that restores native pollinators on farms and other landscapes by creating essential habitats. Primary goals are to increase biodiversity and the native pollinator population.

    - In the U.S. for more than four years, Operation Pollinator has been running in the ag sector in three states – California, Florida and Michigan – with the participation of growers and three universities. The program uses practical, cost-effective practices that address pollinator needs at a local level. The research-based strategies include evaluating regional seed mixes, both annual and perennial, for increasing pollinators and crop pollination. Results show Operation Pollinator has provided significantly greater floral resources throughout the season in all regions and attracted more bees and more bee species. The research results are being used in education outreach to enable the establishment of pollinator habitats in other rural areas. An example of one of the regional brochures for Michigan is appended.

    - Syngenta is working with Marriott Golf and other golf course operators to establish Operation Pollinator plots on more than 100 golf courses. The program advances sustainable golf course management while improving and enhancing the natural habitat for pollinators. It introduces native wildflowers to attract bees and other pollinating insects to out-of-play areas.

Syngenta Good Growth Plan

- Syngenta launched a measurable program in September 2013 to help farmers across the world to grow more food using fewer resources, while protecting nature and improving life for people in rural communities. Called the **Good Growth Plan**, one of our six commitments focuses on enhancing biodiversity on 5 million hectares — more than 12 million acres — of farmland throughout the world by 2020.

Examples of Other Syngenta Biodiversity & Pollinator Forage Improvement Partnerships

- Syngenta has been partnering with **Trees Forever** in Iowa and Illinois for more than 15 years to protect and improve water quality in the Midwest. More than 1.7 million trees and shrubs have been planted through Trees Forever in Iowa and Illinois. This effort includes planting vegetative buffers to reduce runoff and soil erosion, improve soil and water quality and create ecosystems that help preserve biodiversity. Additional pollinator sites are being established on agricultural buffer sites and states' roadway/public land sites. Public involvement, including education, will also be part of the work.

- Conservation in Innovation Grants (CIG) project, in which Conservation Technology Information Center (CTIC) will examine the agronomic and environmental benefits of cover crops. The project also evaluates how cover crops have a positive effect on pollinators.

- Program with **Delta F.A.R.M.** that strives to implement recognized best-management practices (BMPs) to conserve, restore and enhance the environment. Focus areas include: biodiversity, buffer management, soil & water conservation, enhanced wildlife habitat, Integrated Pest Management (IPM) and precision agriculture.

- Syngenta has collaborated with the **North Carolina Botanical Garden** for more than 10 years. A key component of our partnership is preserving and providing native plants for pollinator habitat. Projects include:
    - Invasive plant control education.
    - Seed collection/storage collaborations with the Millennium Seed Bank of Kew Garden, England.
    - "Seeds of Success" program, coordinated by the U.S. Bureau of Land Management and the Center for Plant Conservation.
    - Restoration of the Mason Farm will include establishment of pollinator habitats to serve as a research and education tools.

- Syngenta is supporting a project with North Carolina State University to combine critical ecosystem services, by enhancing vegetative buffers for pollinator habitat. The objectives are:
    - Develop appropriate seed mixes for vegetated buffer zones to enhance bee-pollinator habitat on golf courses, construction sites and roadways.
    - Assess soil treatment (tillage type, amendments) and plant interactions for optimal ecosystem services.
    - Quantify water infiltration and pollinator communities over time in order to select plants that facilitate bee health as well reduce potential runoff.

- Syngenta has partnered with Project *Apis m*. to develop forage establishment near almond groves in order to provide additional food sources for honey bees.

Syngenta Seed Treatment Formulation and Seed Care Centers

- Syngenta has Seed Care Institutes located in the U.S. and around the world. One of these is located in Stanton Minnesota. These institutes are research centers of excellence for:
    - Application technology
    - Seed science and testing
    - Seed treatment quality
    - Seed and Crop enhancement
    - Product support and innovation

Examples of Syngenta Education and Outreach - Best-Management Practices & Stewardship

- Syngenta collaborated on and sponsored the "Guide to Seed Treatment Stewardship," available through the American Seed Trade Association (ASTA) at **www.seed-treatment-guide.com**. The guide details that:
    - Reducing potential exposure to dust is a key step.
    - Best-management practices can help reduce bee exposure to seed treatment insecticides via reducing dust released during planting

- Syngenta sponsors the "Pollinators and Pesticide Stewardship" Brochure, which can be ordered from the Center for Urban/Rural Stewardship (CURES) at www.curesworks.org/home.asp.

- Syngenta sponsors the Pesticide Environmental Stewardship (PES) website that promotes pollinator protection at http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx.

- Syngenta is working with North Carolina 4-H to develop and pilot a pollinator education program that is intended to be offered as a national level resource.

Syngenta "Thrive" magazine - distributed to over 80,000 growers, retailers and other ag professionals nationwide

- The Syngenta October 2013 *Thrive* magazine featured articles on bee health, seed treatment and stewardship, and Syngenta's Operation Pollinator program.

Syngenta communication materials

- Syngenta developed a "Bee Health Update" slide deck for stakeholder presentations. Covers timeline of bee population declines, bee health stressors, key studies, and global milestones about bee incidents and regulatory actions.

- Syngenta produced and distributed handout, "Seed Treatment Stewardship: What seed companies and applicators need to know," at ASTA's CSS 2013 & Seed Expo December 2013 in Chicago. Handout provides background on bee health issue and gives seed treatment best-management practices.

- Syngenta produced and distributed handout, "Top Six FAQs on bees and bee health". Handout includes several sections related to seed treatment, directly references the "Guide to Seed Treatment Stewardship" and website, and incorporates seed treatment best practices.

Pesticide Safety Education

- Syngenta is the industry coordinator and major funding partner of the Pesticide Environmental Stewardship (PES) website, addressing basics of pesticide stewardship **http://pesticidestewardship.org**.

- Syngenta co-leads the National Stakeholder Team for Pesticide Safety Education Program Funding, a team of over 65 organizations focused on educating applicator **http://psep.us/**.

- Syngenta provides grants to Pesticide Safety Education Programs throughout the U.S. and is a major funder of an initiative to strengthen these programs and produce important national educational materials and training programs.

- Syngenta collaboratively developed national resources to promote pesticide safety education **http://pesticidestewardship.org/Pages/Resources.aspx** for a variety of groups, such as: agronomy and horticultural education, beekeeping organizations, community educators, Master Farmers, county and university Extension offices, National Association of Conservation Districts, Pesticide Safety Education Programs, state departments of agriculture, and U.S. Tribal Education.
  - Pollinators and Pesticide Stewardship brochure with Coalition for Urban/Rural Environmental Stewardship (CURES) and Bayer
  - Brochure on the basics of pesticide stewardship in English and Spanish with National Association of County Agricultural Agents.

- Personal Protective Equipment brochures in English and Spanish with National Association of County Agricultural Agents and National Pesticide PPE Training Solutions Committee.
- Brochure on the value of buffers for pesticide stewardship, biodiversity, etc., with Delta F.A.R.M. (Farmers Advocating Resource Management)
- Basics of pesticide stewardship brochure specifically for aerial applicators with National Agricultural Aviation Association and the National Agricultural Aviation Research and Education Foundation
- Basics of pesticide stewardship brochure specifically for pest management professionals (PMPs) with North Carolina State University

- Syngenta has added the new pollinator protection labeling from EPA's new bee advisory labeling guidance on all Crop Protection and Lawn and Garden foliar-applied products containing its neonicotinoid thiamethoxam for the 2014 use season. This is in addition to its pollinator protection language already on the labels.

- Syngenta actively participates in several organizations focusing on BMPs, product label language, product stewardship and pollinator protection:
  - EPA Pesticide Program Dialogue Committee (PPDC) Label and BMPs workgroups.
  - CropLife America (CLA) Pollinator Issues Management Team (PIMT)
  - CLA Seed Treatment workgroup
  - American Seed Trade Association
  - North America Pollinator Protection Campaign (NAPPC)

Multiple pollinator and bee health initiatives throughout the world.

Hyperlinks:

- **Operation Pollinator:** http://operationpollinator.com/
- **Good Growth Plan:** http://www.syngenta.com/global/corporate/en/goodgrowthplan/home/Pages/homepage.aspx
- **Trees Forever:** http://www.treesforever.org/Pollinators
- **Delta F.A.R.M**.: http://www.deltafarm.org/
- **North Carolina Botanical Garden:** http://ncbg.unc.edu/
- **www.seed-treatment-guide.com:** http://www.seed-treatment-guide.com/
- **October 2013 *Thrive* magazine**: http://www.nxtbook.com/syngenta/Thrive_Flipbooks/SyngentaThrive4Q2013/index.php
- **http://pesticidestewardship.org:** http://pesticidestewardship.org
- **http://psep.us/:** http://psep.us/
- **http://pesticidestewardship.org/Pages/Resources.aspx:** http://pesticidestewardship.org/Pages/Resources.aspx

Attached – Operation Pollinator – Michigan

Photo: Rufus Isaacs

ENVIRONMENTAL INFORMATION

Operation Pollinator

Managing environmental margins for improved crop pollination

OPERATION Pollinator™

- Selection
- Establishment
- Management

AgriEdge Excelsior®

syngenta®

What is Operation Pollinator?

Managed by Syngenta, Operation Pollinator aims to boost native bee numbers in arable farmland. Based on the experience gained from ongoing research, Operation Pollinator is working with growers to establish wildflower-rich field margins in key locations for pollinator recovery.

Why Operation Pollinator?

Populations of some native bees have declined dramatically over the last few decades mainly due to loss of habitat.

Now, with pollinator protection a key component of the 2008 Farm Bill, there is the opportunity to create hugely beneficial wildlife havens, with real economic returns for farmers.

Boosting native bee populations is a clear benefit farmers can achieve with effective native plant management. Preliminary results from Operation Pollinator show native pollinators respond very positively when regionally adapted wildflower mixes are planted.

Managing field margins specifically for native pollinator habitat significantly increases other biodiversity and brings about real environmental benefits, leaving growers to continue farming efficiently and profitably on the most productive parts of the field.

This start-up guide provides invaluable practical pointers and reminders for the successful establishment of beneficial wildflower margins, designed to restore the fortunes of our wild pollinators.

Operation Pollinator

The aim of Operation Pollinator is to develop and test regionally adapted wildflower mixes to promote the health of native pollinator populations in agricultural landscapes and increase their delivery of ecosystem services.

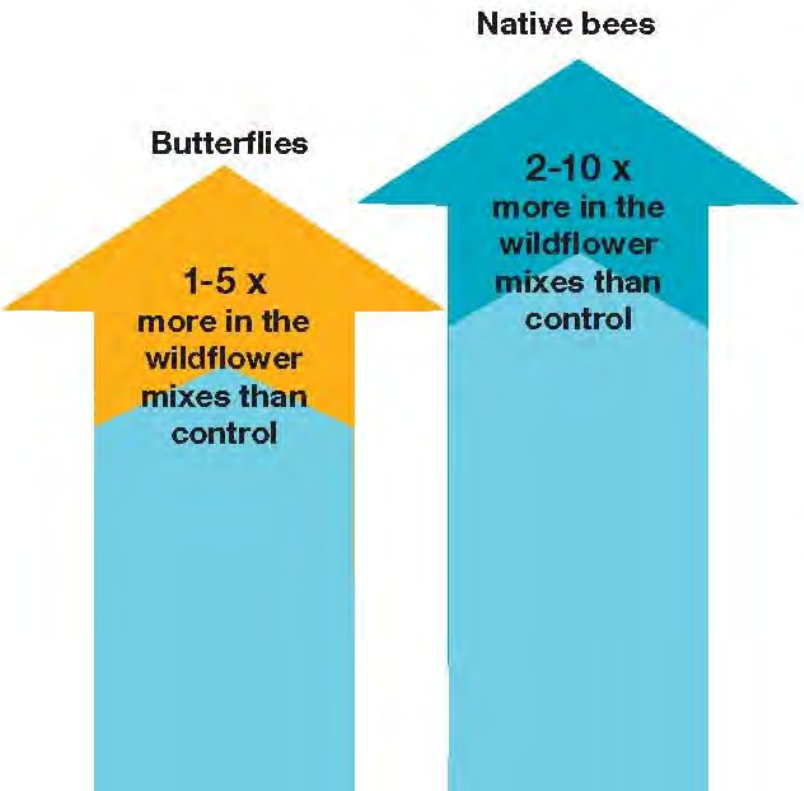
Wildflower mixes were tested on several farms in each of three regions. Plot establishment and data collection were conducted by researchers at the University of California–Davis, Michigan State University and University of Florida.

The project has confirmed that high quality wildflower seed mixes can be established in one year, with bee abundance increasing as the plots continue to mature.

Photo: Rufus Isaacs

Bombus impatiens

This bumble bee is a native bee that commonly visited wildflower plots during the Operation Pollinator study. Here a worker bumble bee visits a raspberry flower. These insects are very efficient pollinators of many fruit and vegetable crops, and they require access to flowers through the season to build their colonies.



Wildflower plots attracted native bees, butterflies and other insects in greater numbers than the weedy vegetation commonly found next to crop fields.

These results give confidence that creating wildflower plantings could increase the native bee numbers and support biodiversity across the farm.

Operation Pollinator has been sponsored by: Syngenta, the National Fish and Wildlife Foundation, USDA BLM, USDA Forest Service, US Fish and Wildlife Service, Applewood Seed Company, and the W.K. Kellogg Foundation.

Farm Assessment

This guide provides information to help growers enhance or restore habitat on their farms for native bees. The right mix of native plant species will bloom all season and provide a continuous source of pollen and nectar needed by native bees.

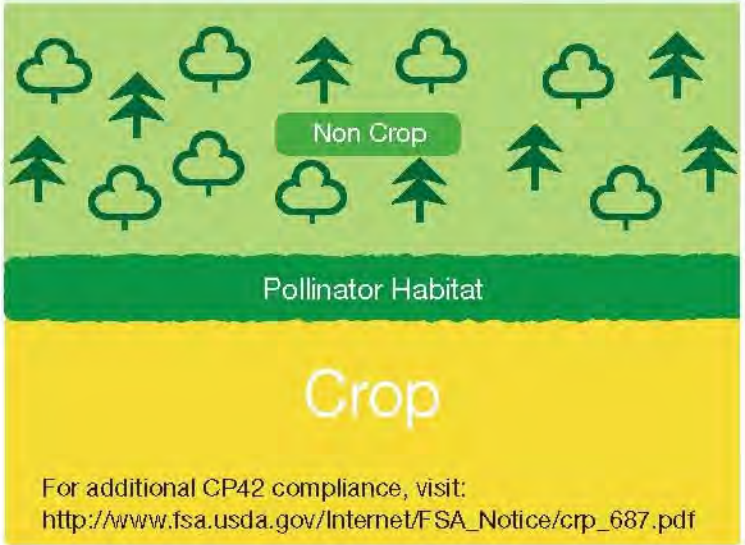
Selecting the right site for establishing pollinator habitat margins is key to success. The site should also be practical to manage, maximize wildlife benefits and fit in the overall farm management operation. Any USDA support payments must comply with CP42 requirements. In certain Michigan counties, higher payments may be possible through the USDA-FSA's SAFE Program.

Margin management

1. Site planning

- Situate Operation Pollinator plantings in non-crop areas or field borders.
- Proper site preparation to minimize weeds is essential to successful establishment of pollinator habitat. A full season of site preparation (for example, 2-3 evenly-spaced applications of broad spectrum herbicide or repeated mowing or tillage) before fall planting is recommended.
- Most Michigan wildflowers are adapted to local rainfall patterns, so additional watering should not be required.
- Locations such as next to a woods or natural area are the best for bees and butterflies.

Where possible, select sites on the upside of prevailing winds, which will help protect from spray and fertilizer drift.



For additional CP42 compliance, visit:
http://www.fsa.usda.gov/Internet/FSA_Notice/crp_687.pdf

1. Site planning

June (before fall seeding)

CP42 compliance considerations

- Before planting, talk to your local NRCS staff or to a native plant expert to confirm local CP-42 requirements for establishing native plants in your area.
- Seed mixes must contain a minimum of 9 pollinator-friendly flowering plant species, including wildflowers, legumes and/or shrubs, with no more than 25% grasses, based on pure live seeds per square foot.
- Any grasses included must be native, preferably non sod-forming bunch grasses.
- At least 3 species in the mix must initiate bloom during each period of April-June 15, June 15-July and August-October.
- Seed mixes must be seeded at a rate of at least 15-30 pure live seeds per square foot.

Margin size
Pollinator habitat margins must be a minimum of 20 feet wide and 0.5 acres to meet CP42 requirements.

For CRP-SAFE, habitat must be 2 acres total and can be made up of smaller areas, at least 0.25 acres.

CRP-SAFE (CP38E) considerations

- Michigan has a pilot program for establishing pollinator habitat through 2013 supported by USDA-FSA and NRCS. The CRP-SAFE program has a goal of 2,500 acres of pollinator habitat in west Michigan counties. Seed mixes must contain a minimum of 12 pollinator-friendly flowering plant species from the provided list, with a minimum of 2 lb pure live wildflower seed per acre and 2 lb pure live seed of native grasses.
- At least 3 species in the mix must initiate bloom during each period of April-June 15, June 15-July and August-October.

October/November **May/June** **July, August, September**

Ideal sowing window

Spring sowing window

2. Site preparation and establishment

- A fine, firm seed bed is required.
- Remove as many weeds as possible—particularly any perennials—before sowing. (If weeds are a problem on your site, begin site preparation one to two years before sowing wildflower seeds.) A smothering cover crop such as buckwheat or soybeans can be used to prepare the land.
- At minimum, till the ground in the early fall, use a non-selective herbicide on the new green growth 1-2 times and seed with minimum ground disturbance.
- **DO NOT BURY SEED.** Wildflowers are adapted to germination on or near the soil surface. Broadcast or drill seed on the soil surface. This can be achieved with most drills.
- Ring roll or lightly cultipack after sowing to achieve good seed to soil contact.
- Plant perennials and annuals as separate strips to allow for better management.

Photo: Kimiora Ward

Sowing dates
Ideally, sowing should take place during October-November once the soil is too cool for germination. Alternately there is opportunity to sow in May-June, although this is less reliable and will tend to yield fewer flowers and more weeds.

The Operation Pollinator Michigan Pollen and Nectar Seed Mix	PLS lbs/ac
Black eyed Susan	0.2
Wild lupine	0.3
Sand coreopsis	0.2
Culver's root	0.2
Yellow coneflower	0.25
Wild bergamot	0.25
Cup plant	0.1
Showy goldenrod	0.3
New England Aster	0.3

Consult with a local native plant expert to insure the mix that is right for your soils.

For sites with medium-wet soils, use Boneset, Blue lobelia, and Riddel's goldenrod.

- Sow at no less than 2 PLS (pure live seed) lbs/acre.
- Grass-specific herbicide can remove aggressive grass weeds that threaten the sown mixture.
- The above mix was developed based on the science from Operation Pollinator field trials.

3. Planting management


Photo: Rufus Isaacs

Summer months

Weed control during establishment

Mow every year, July, August or September

3. Margin management

The aim is to establish a dense planting that will crowd out unwanted weed species. Effectively managed flower plantings will last for multiple seasons.

Mowing

- For best results, mow higher than any wildflower seedlings in late spring to reduce cool-season grasses. In the summer use a high mowing (6 inch cut height) once a month in summer to prevent weed seeding and favor establishment of the wildflowers.
- Reduce mowing intensity in Year 2 (two summer mows) and Year 3 (one summer mow).
- If possible, cut with a mower that will produce fine (multi-chop) clippings.

Chemical weed control

If competitive grass weeds such as crabgrass start to become established in the planting, use Fusilade Max® to achieve control as soon as possible, preferably while the grass weeds are small. Should you require further information on weed control, please contact your local Syngenta specialist.

Other

Unless specified, pesticides and fertilizers should NOT BE APPLIED TO, OR ALLOWED TO DRIFT ONTO, the sown area.

4. Crop management

Crops alongside Operation Pollinator wildflower plantings can be managed using conventional or organic crop management approaches.

Take care to avoid pesticide and fertilizer overspray onto wildflower plantings, particularly non-selective insecticides during sunny days, and broadleaf herbicides in the autumn.

Provided insect predator and pest populations are in balance within the margin, there is no additional risk from aphids or other insect pests to the crop.


Photo: Rufus Isaacs

REMEMBER TO avoid spraying insect pests beside margins when wildflowers are in full bloom. ALTERNATIVELY spray in late evening when bees are less active.

Monitor crops alongside margins for signs of wildflower or weed encroachment.

Effectively managed wildflower margins minimize the risk of grass weeds establishing on the site.

Meet the Wildflowers

These perennial wildflower species can be mixed for season-long bloom to support bees.

BLUE LOBELIA
Blooms early summer.

SAND COREOPSIS
Blooms early summer.

BONESET
Blooms late spring/summer.
Useful in wetter sites.

WILD BERGAMOT
Blooms early summer.

CULVER'S ROOT
Blooms mid-summer.

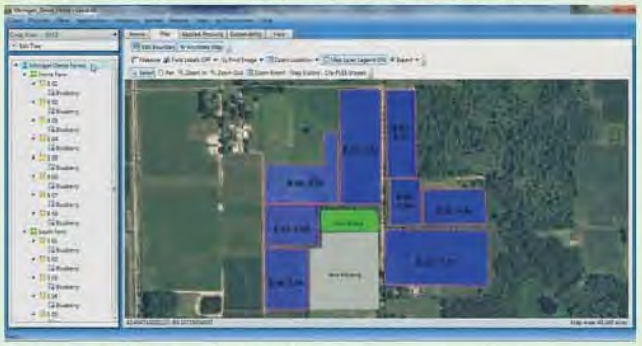
CUP PLANT
Blooms mid-summer.

BLACK-EYED SUSAN
Blooms summer to fall.

NEW ENGLAND ASTER
Blooms late summer into fall.

SHOWY GOLDENROD
Blooms late summer into fall.

Agricultural landscapes can provide essential foraging and nesting habitat for native bees and other beneficial insect species. With the right management, designated crop margin areas can provide ideal habitat for a vast array of pollinating insects and can potentially improve the grower's yield, fruit quality and profitability.



Syngenta's Operation Pollinator supported by Agri-Edge Excelsior® gives growers the tools and skills to successfully and cost-effectively establish and manage attractive wildflower resources that are crucial for native bees and other pollinating insects. Operation Pollinator guidelines and advice have been developed specifically for agricultural landscapes in conjunction with university researchers and agronomists from Michigan State University.

Through Operation Pollinator, growers and the agribusiness community will see firsthand how sustainable agriculture and science-based solutions can work together to feed a growing world.

Summary:

Establishing wildflower plantings can:

- **Significantly increase native bee numbers**
- **Hugely benefit butterflies and other insects**
- **Create habitats for farmland birds**
- **Simplify field management**
- **Achieve basic cross-compliance requirements**
- **Qualify for additional environmental payments**
- **Have minimal impact on cropped areas**
- **Create a more sustainable economic farming system**

Photo: Rufus Isaacs

Operation Pollinator

For further information, please contact:
Syngenta agri-environment specialist, Jeff Peters
Contact information:
Phone : 336-632-7675
E-mail: jeff.peters@syngenta.com

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For more information, visit www.operationpollinator.com or www.syngentacropprotection.com or call the Syngenta Customer Center at 1-866-SYNGENT(A) (796-4368).

99900496A

From: Thomas Thiss [tthiss@aol.com]
Sent: Thursday, May 01, 2014 5:23 PM
To: Regimbal, Gregg (MDA)
Subject: Neonics

625 Robert Street North

St. Paul, MN 55155-2538

Dear Mr. Regimbal,

RE: MDA scoping of neonicotinoid review

I am a member of Gideon Cove, an association of 12 town homes in Shorewood. We contract for lawn maintenance and I am concerned about the chemicals they use.

I applaud the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Historically, Minnesota has ranked in the top 5 honey-producing states in the nation. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through common-sense action to protect bees from neonicotinoids.

In addition to the proposed scope of MDA's review of neonicotinoids, I recommend the following additions:

1. As part of a review of neonicotinoids, MDA should investigate options for **reducing and restricting the use of neonicotinoid insecticides**—and, hence, the risk of pollinator exposure. Minnesota policy-makers and the public would benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.

Strategies for reducing neonicotinoid use may include both voluntary steps (like BMP's, or increasing availability of untreated seeds and plants for farmers and gardeners) and regulatory action (tracking neonicotinoid seed treatments, classifying neonicotinoids as restricted use pesticides, or creating a Minnesota supplemental label with additional use restrictions). The review should include MDA's perspective on the opportunities and obstacles associated with various approaches to reducing the use of neonicotinoids.

1. In assessing the benefits of neonicotinoid use in Minnesota agriculture, MDA should take into consideration the growing body of evidence indicating that neonicotinoid seed treatments **do not consistently increase yields or profitability** when used on major Minnesota crops like corn, soy, canola, wheat, and dry beans. A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered farmers any economic benefits." A 2006 study of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the

grower." Peer-reviewed research on yield impacts of neonicotinoids on Minnesota's major crops must be included in MDA's assessment.

1. MDA should enhance applicator education and enforcement of all neonicotinoid insecticide labels. In particular, per acre use limits should be strictly enforced.

The Minnesota Department of Agriculture's review of neonicotinoids comes at an excellent time, as new laws to protect pollinators move through the legislature and growing numbers of Minnesotans call for even stronger solutions to bee declines. MDA's engagement on this issue is laudable and reflects the agency's bold commitment to pollinator protection. MDA's review shouldn't stop with an assessment of current impact of neonicotinoids, but instead, work to minimize the usage and effects of neonicotinoids in order to protect our state's agricultural system and safeguard pollinators.

Sincerely,

Tom Thiss

Resident of Gideon Cove

THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION

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Pesticide and Fertilizer Management Division
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gregg.regimbal@state.mn.us

Comments to The Minnesota Department of Agriculture's Pesticide and Fertilizer Management Division's *Scoping a Review of Neonicotinoid Use, Registration and Insect Pollinator Impacts in Minnesota*.

April 30, 2014

Dear Dr. Regimbal:

The Xerces Society for Invertebrate Conservation (Xerces) hereby submits these comments regarding the Minnesota Department of Agriculture Pesticide and Fertilizer Management Division's (MDA) *Scoping a Review of Neonicotinoid Use, Registration and Insect Pollinator Impacts in Minnesota.*

The overall breadth and depth MDA has proposed for the review of neonicotinoids demonstrates a solid understanding of neonicotinoid uses and risks. MDA is reviewing many important issues that will help determine effective measures to minimize the impacts of neonicotinoid use on pollinators. Thank you.

We are especially pleased to see that the review will:

- Estimate the additional mass of neonicotinoids released into Minnesota's environment from neonicotinoid treated seeds.
- Summarize issues associated with "planter dust" and the potential risk to pollinators.
- Encompass a broad set of neonicotinoid uses including agricultural, home, ornamental, and landscape uses.
- Consider risks to other beneficial insects as well as aquatic risks.
- Summarize activity focused on revising insect pollinator toxicity testing to address uncertainty surrounding the use of surrogates.
- Summarize risks associated with the prophylactic use of neonicotinoids.
- Include information on specific risks to insect pollinators through various routes of exposure.
- Summarize the U.S. Environmental Protection Agency's label changes and concerns related to interpretation and implementation.

Clearly the risks neonicotinoids pose to pollinators are complex. While federal regulation is driven mostly by acute toxicity, these immediate risks are only one of multiple components. Research is finding many more subtle yet just as concerning issues including: (a) delayed sub-lethal effects such as olfactory loss in adults after exposure as larvae;[1] (b) synergistic effects with fungicides;[2] and (c) time cumulative effects of long-term exposure to these long-lived chemicals.[3]

Xerces does not expect MDA to find outcomes to address the myriad of issues that exist. Still, we believe there are some relatively straight forward issues that MDA can review in order to find Minnesota-specific solutions to better protect the health of native and managed pollinators.

The following comments outline specific issue areas that Xerces recommends be included within the review.

A. The Review of Neonicotinoid Use and Sales Should Include a Review of Product Labels

Pesticide use practices vary depending on personal preferences, equipment, pest pressure, crop variety, weather patterns, and many other variables. Whereas, a product label provides clarity on what is legal. To protect pollinators, understanding how products can be used – not just reviewing voluntarily reported use practices – will provide significant insight into appropriate outcomes.

The review of labels is especially important as the vast majority of neonicotinoid products are general use, whether designed for commercial or home use. Rarely is a license required to apply a general use product. The main exception is if the applicator is hired to apply the product to a third party's property. Therefore, in many instances the only information an applicator has is the label with no additional training.

Specific label assessment ideas follow.

1) Assess the discrepancy between application rates for backyard garden products and agricultural products

Xerces staff compared legal label rates of the active ingredient imidacloprid for use on apple trees in a backyard in comparison to agricultural application rates.[4] The analysis took into account multiple variables including the number of trees per acre and the diameter of the tree.

The low end estimate of the application rate for backyard use was 12 times higher than the agricultural rate. By including factors such as agricultural applicators applying amounts less than the maximum rate, use rates in a backyard could be up to 120 times higher than in agriculture.

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[1] Yang E.C., et al. (2012) Impaired Olfactory Associative Behavior of Honeybee Workers Due to Contamination of Imidacloprid in the Larval Stage. PLoS One 7(11): e49472.

[2] Biddinger D.J., et al. (2013) Comparative toxicities and synergism of apple orchard pesticides to *Apis mellifera* (L.) and *Osmia comifrons* (Radoszkowski). PLoS One 8: e72587.

[3] Sanchez-Bayo, F. Koichi Goka. (2014) Pesticide Residues and Bees – A Risk Assessment. PLoS One 9(4): e94482.

[4] Hopwood, J. et al. (2012) Are Neonicotinoids Killing Bees? A Review of Research into the Effects of Neonicotinoid Insecticides on Bee, with Recommendations for Action. The Xerces Society for Invertebrate Conservation. 21-22.

MDA should review product labels to determine the extent of this discrepancy and consider bringing backyard use rates in line with agricultural rates.

2) **Review bee toxicity warning language on backyard garden products sold in Minnesota to ensure a statement of potential risk to pollinators is included, clearly stated and highly visible.**

Xerces has noted that not all backyard garden product labels include language about toxicity to bees (e.g. Bayer Advanced 12 Month Tree and Shrub Insect Control II). Such labels contain no restrictions on use of these products to mitigate risks to bees (e.g. some backyard garden products can be applied just prior to or during bloom, and can also be applied while bees are active).

A review of all backyard garden products sold in Minnesota by MDA would determine which products have labels that include a warning of risks to bees and guidelines for use. If the review finds a lack of clear pollinator risk language on some labels, MDA should require modified labels from registrants, in order that garden products include the bee toxicity warning as well as increase guidelines for use.

Reviewing labels to ensure that there is language on bee toxicity and use will also be an opportunity to consider opportunities for increasing the visibility of these warnings, which could potentially reduce bee exposures.

On a similar note, as the federal government adds new pollinator protection language to some labels, consistency issues are arising. Product labels are beginning to have pollinator protection language in multiple places and in some cases this language is inconsistent. For example, the clothianidin product Arena 50WDG's Environmental Hazard statement says: "This product is toxic to bees exposed to treatment and for more than 5 days following treatment. Do not apply this product to blooming, pollen-shedding, or nectar-producing parts of plants if bees may forage on plants during this time period." Yet a later Bee Hazard section states that applications can occur if certain conditions to protect managed bees are met, such as notifying the beekeeper so that s/he can cover or remove the hives.[5]

3) **Summarize data on efficacy rates and compare to legal application rates**

Xerces has heard from some pest management professionals that maximum use rates for ornamental uses are significantly higher than efficacy rates for specific pests. A systematic review of key Minnesota pests and effective control rates for use of neonicotinoids might reveal ways to reduce risk to pollinators while maintaining crop protection tools.

A Best Management Practices guide produced by New York State Department of Environmental Conservation, Cornell University Cooperative Extension and Bayer CropScience highlights the potential that maximum rates are above effective rates. The document suggests that applicators

[5] Arena WDG 2014 label, EPA Reg No. 59639-152 (See pp 5 and 8). http://www.epa.gov/pesticides/chem_search/ppls/059639-00152-20140114.pdf (last viewed 4/29/14).

use the lowest labeled application rate.[6] That recommendation suggests that the lowest application rate is effective, at least in the vast majority of cases. Through a review, MDA might find that maximum label rates could be reduced without impacting efficacy.

4) **Evaluate whether any product labels recommend the use of other pesticides or agricultural chemicals in combination with the product**

Pesticide product labels sometimes recommend use of other pesticides or agricultural chemicals in conjunction with the product. By understanding what other chemicals might be used in close temporal proximity or in a single tank-mix, the effects of these mixtures can be reviewed.

Due to the significant risk of synergistic effects of two pesticides applied at once, special attention should be paid to any language recommending cyano-substituted neonicotinoids (i.e. acetamiprid and thiacloprid) in conjunction with ergosterol inhibiting fungicides.[7] [8]

This label evaluation will inform MDA's review of pollinator risks by providing a better understanding of what pesticide mixtures are likely.

5) **Evaluate whether products have clear limits on the amount that can be applied per season.** These limits can be set through label statements on: the number of times a product can be applied per season at the maximum dose, frequency of application at the maximum dose, or an annual application limit.

Clarity on the legal limits on the amount of a pesticide that can be applied during a single growing season can significantly reduce the amount of a pesticide used, thus reducing exposure rates. If the label doesn't have some indication of a total amount that can be applied or how frequently the product could be applied, significant over-application could occur.

As mentioned above, the vast majority of neonicotinoid pesticide products are general use. While some general use products will be applied by licensed pesticide applicators, numerous unlicensed pesticide applicators will use these products both in their homes and as employees of a business, such as a farm or nursery, without any training beyond what is on the label.

Reviewing labels and prompting the necessary corrections can ensure that there is a stated seasonal maximum thus clarifying legal use and reducing seasonal over-applications.

B. The Review of Neonicotinoid Use and Sales Should Include a Review of Overall Pesticide Use to Inform Cumulative Risk Assessment

More specifically, the review of use practices should ask the following questions:

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[6] Imidacloprid: Pest Management Practices for Long Island, New York. http://ccesuffolk.org/assets/galleries/Agriculture/Imidacloprid-BMP-Greenhouses-and-Nurseries.pdf (last viewed 4/17/14).

[7] Iwasa T., et al. (2004) Mechanism for the differential toxicity of neonicotinoid insecticides in the honey bee, *Apis mellifera*. Crop Protection. 23: 371- 378.

[8] Biddinger D.J., et al. (2013) Comparative toxicities and synergism of apple orchard pesticides to *Apis mellifera* (L.) and *Osmia comifrons* (Radoszkowski). PLoS One 8: e72587.

1) **Are numerous neonicotinoid treatments occurring on the same site/crop in a single growing season?** For example, do growers use both injection and foliar treatments during a single season?
2) **What other products are applicators using with neonicotinoids?** Both tank mix and applications within close temporal proximity should be noted.
3) **Are actual application rates below maximum application rates?** If so, on which sites/crops and for which pests?
4) **Is neononicotinoid use repeated annually?** If so the implications of repeated applications of these long-lived pesticides should be reviewed.

Understanding common use practices will help provide important baseline information to evaluate potential risk factors. It also will inform the discussion of efficacy rates compared to label rates.

C. Consider Minnesota Native Invertebrates in the Review of Risk

1) Review specific concerns for imperiled bumble bees native to Minnesota

Numerous imperiled bumble bee species are native to Minnesota (including *Bombus affinis*, *Bombus terricola*, and *Bombus pensylvanicus*), and they are susceptible to parasites that may be spread by commercially reared bumble bees (e.g. *Nosema bombi*, and *Crithidia bombi*).

The combined exposure to neonicotinoids and the *Crithidia bombi*'s protozoan gut parasite could significantly reduce survival of queen bumble bees.[9]

Sublethal neonicotinoid exposure alone can also decrease queen reproduction and colony health, further impacting these already imperiled populations.[10] [11]

Mapping out areas of Minnesota where these species still occur and considering actions to protect these populations from neonicotinoid exposure could go a long way to protect these at risk species. The Xerces Society recommends MDA consider prohibiting use of neonicotinoid products in the areas where these species are known to still occur.

2) Consider specific concerns for *Peponapis pruinosa* (squash bee), a valuable pollinator of *Cucurbita* spp.

The squash bee, *Peponapis pruinosa*, is a solitary bee that nests in the soil at the base of *Cucurbita* spp. (e.g. pumpkin, winter squash, and summer squash). Unlike honey and bumble bees, which forage on a wide variety of crops, *Peponapis pruinosa* depends almost exclusively on the pollen and nectar of *Cucurbita* spp.

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[9] Fauser-Misslin, A., et al. In press. Influence of combined pesticide and parasite exposure on bumblebee colony traits in the laboratory. Journal of Applied Ecology: doi: 10.1111/1365-2664. 12188.

[10] Gill, R. J., et al. (2012). Combined pesticide exposure severely affects individual-and colony-level traits in bees. Nature doi:10.1038/nature11585.

[11] Whitehorn, P. R., et al. (2012). Neonicotinoid pesticide reduces bumble bee colony growth and queen production. Science 336(6079):351–352.

Peponapis pruinosa's foraging practices are well adapted to the *Cucurbita* spp. as they start to forage immediately when blossoms open in the morning which is earlier than honey bees generally forage. *Peponapis pruinosa* is considered a primary pollinator for *Cucurbita* spp.

The specific adaptations that make *Peponapis pruinosa* an important pollinator for *Cucurbita* spp. also increase the bee's risk of exposure to neonicotinoids applied to *Cucurbita* crops.[12] *Peponapis pruinosa* may be exposed to neonicotinoids through ingestion of contaminated *Cucurbita* spp. pollen and nectar, or through drenches to the soil where they build their nests.

Considering *Peponapis pruinosa*'s specific concerns would be a valuable component of the neonicotinoid review.

3) Review potential impact to Minnesota's Species of Greatest Conservation Need

The state of Minnesota has many Lepidoptera species listed in the Species of Greatest Conservation Need (SGCN). Butterflies and other lepidopterans are extremely sensitive to neonicotinoids as Lepidoptera are one of the target pests for neonicotinoids. Furthermore, the systemic nature of neonicotinoids, combined with their widespread use, high toxicity and longevity could lead to significant risk to these already severely diminished populations.

Reviewing methods to protect key habitat, as well as host and forage plants will help ensure these already at risk species are not put in further jeopardy from the use of neonicotinoids.

There are many other species listed on the SGCN that also should be within the purview of this review.[13] For example, the list includes thirteen Caddisfly species. Tests performed on Caddisfly larvae have shown them to be significantly more sensitive to neonicotinoids than common the insect surrogate daphnid.[14] Furthermore, neonicotinoid insecticides are very mobile in water, and are increasingly documented in streams and wetlands adjacent to treated fields.[15]

D. Evaluate Possibility of Prohibiting Use of Neonicotinoids on Bee Attractive and Pollinator Host Plants.

After four bee kill incidents were reported in Oregon in 2013, the Oregon Department of Agriculture (ODA) led an investigation that resulted in a new condition of registration for products containing the chemicals at issue in these incidents: imidacloprid and dinotefuran.

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[12] 2013. Scientific Rationale to limit currently labeled neonicotinoid uses and place on hold all pending registrations of neonicotinoid (clothianidin, thiamethoxam, dinotefuran) uses on pumpkins, squashes and watermelons. Submitted to Health Canada's Pest Management Regulatory Agency.

[13] http://www.leg.state.mn.us/docs/2006/Other/060316/www.dnr.state.mn.us/cwcs/set.html#insects (last viewed 4/18/14).

[14] Yokoyama, A. (2009). A useful new insecticide bioassay using first-instar larvae of a net-spinning caddisfly, Cheumatopsyche brevilineata (Trichoptera: Hydropsychidae). Journal of Pesticide Science; 34 I(1) 13.

[15] Main, A.R., et al. (2014).Widespread Use and Frequent Detection of Neonicotinoid Insecticides in Wetlands of Canada's Prairie Pothole Region. PLoS One 9(3): e92821.

ODA made it a condition of 2014 registration that use of imidacloprid and dinotefuran were prohibited on *Tilia* trees.[16] *Tilia*, also known as linden and basswood trees, are a key forage plant for many bee species.

MDA could begin to hone risk reduction measures much like ODA's decision. Prohibiting use of neonicotinoids on plants that are highly attractive to bees and other pollinators, or that serve as butterfly host plants, would eliminate a significant pollinator exposure route without removing crop protection tools from other crops less likely to lead to pollinator exposure.

E. Within the Risks of Neonicotinoid Use Review, Assess Applicator Licensing and Training to Determine Areas Where Greater Oversight and/or Outreach Are Needed

1) Determine which economic sectors hire unlicensed applicators to use neonicotinoids. Attempt to understand risks associated with unlicensed use

As stated previously, the vast majority of neonicotinoid products are general use. That means that use by business employees can be done onsite without any training beyond following the label. As MDA understands, there are many nuances in pesticide applicator licensing, but most simply put, the vast majority of neonicotinoid products can be used by unlicensed, untrained individuals unless they are applying the product for hire to the property of a third party.

When initially registered by the U.S. Environmental Protection Agency, the vast majority of neonicotinoid products were considered low enough risk that they could be designated general use. Since then many harmful effects have come to light. Still, due to the general use designation, even products with relatively high amounts of an active ingredient are general use.

Understanding the benefits of licensing applicators or, conversely, understanding the risks associated with unlicensed and untrained applicators, could help determine potential measures to protect pollinators.

Depending on the results of the review, there are multiple ways to address potential concerns of commercial unlicensed use of neonicotinoid products. The Xerces Society supports requiring pesticide licenses for everyone paid to apply pesticide products. In the state of New York some general use neononicotinoid products have been denied registration due to their risk to non-target organisms.[17] Xerces also supports efforts to register products currently listed as general use as restricted use.

2) Assess current training materials in order to identify potential gaps

There are many ongoing efforts to ensure licensed applicators receive training to better protect pollinators. Understanding which applicators have received pollinator protection training, if the

[16] ODA takes steps to protect pollinators from pesticide impacts. http://www.oregon.gov/ODA/Pages/news/131121bee_measures.aspx (last viewed 4/18/14).

[17] Serafini, M.P. (2008). New York State Department of Environmental Conservation. Denial of Application to Register the New Active Ingredient Dinotefuran Contained in the Pesticide Product Safari 20 SG Insecticide (EPA Reg. No. 33657-16-59639), Venom 20 SG Insecticide Insecticide (EPA Reg. No. 33657-16-59639) and Venom Insecticide EPA Reg No. 59639-135).

training is being put into practice, and what gaps exist in the current training programs would help hone future training efforts.

F. Review Data on Seed Treatment and Other Prophylactic Uses

Planting of neonicotinoid treated seeds in canola, corn, dry beans, soybeans, and wheat production is commonplace. More than 90% of the canola seeds planted in North America are treated.[18] While it is often taken for granted that this added "insurance" provides benefit to the grower, a growing body of independent research is demonstrating mixed results. Several studies show minimal, inconsistent, or no yield benefits of planting seeds with neonicotinoid seed-coatings.[19]

Understanding why treated seeds are used and if and when they provide economic benefit could lead to measures that could help reduce use and protect pollinators. These measures could include guidance to the grower community on crop scouting for pests best treated by neonicotinoid seed coatings, developing reduced risk Integrated Pest Management plans that do not involve unwarranted prophylactic treatments, and crop-specific techniques for minimizing the impacts of pesticide use on bees and other pollinators.

Within this evaluation, it also might be worth exploring whether the use of seed treatments, soil pre-treatments and other prophylactic use could increase the risk of pest resistance to neonicotinoids.

G. Estimate Financial Losses Caused by Neonicotinoid Uses in Minnesota

Federal pesticide regulation has a cost-benefit component. Yet, currently the cost of neonicotinoid use is not well understood. For example, we do not know how many hives per year are lost because of exposure, nor do we fully understand – nor can we likely measure – the impacts to non-target beneficial insects that release new pests, nor loss of aquatic invertebrates that may serve as food for fish and wildlife. That lack of information makes understanding actual risk difficult and severely hinders any cost-benefit comparison.

While the Federal Insecticide Fungicide and Rodenticide Act allows some risk, it does not allow for unreasonable adverse effects. Therefore, MDA could include an analysis of potential cost in pollinator losses due to the use of neonicotinoids. Clearly, this is a complicated issue. However, increasing our basic understanding of the impact of neonicotinoid use in Minnesota on native and managed pollinators would be a very valuable undertaking.

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[18] Storka, J.J. et al. (2008). Impact of decreasing ratios of insecticide-treated seed on flea-beetle feeding levels and canola seed yields. Journal of Economic Entomology. 101(6): 1811-1820.

[19] 2014. Heavy Costs: Weighing the Value of Neonicotinoid Insecticides in Agriculture, Center for Food Safety. http://www.centerforfoodsafety.org/issues/304/pollinators-and-pesticides/reports/2999/heavy-costs-weighing-the-value-of-neonicotinoid-insecticides-in-agriculture# (last visited 4/17/14).

CONCLUSION

As we outlined in the above comments we strongly support MDA's *Scoping a Review of Neonicotinoid Use, Registration and Insect Pollinator Impacts in Minnesota*. Many important issues will be explored through this review, shedding light into much needed actions to protect pollinators from neonicotinoid pesticides.

The comprehensive review you propose to conduct will provide a clearer picture of risks and allow Minnesota to hone needed mitigation measures. Our comments highlight specific issues that should be included in the scope of the review.

Thank you for providing us the opportunity to comment on this valuable process. We look forward to watching as the review unfolds. If you have any questions, please do not hesitate to contact us.

Sincerely,

Aimee Code, Pesticide Program Coordinator
Xerces Society for Invertebrate Conservation

Below is text common to 401 comments submitted. These comments can be viewed at http://www.mda.state.mn.us/chemicals/pesticides/regs/scopingneonics.aspx

Dear Mr. Regimbal,

I applaud the Minnesota Department of Agriculture for proactively addressing the issues facing pollinators, and for examining neonicotinoid insecticides as a key catalyst in declining bee populations. Historically, Minnesota has ranked in the top five honey-producing states in the nation. Given the significance of bees to Minnesota's agricultural economy, our state must also take leadership through common-sense action to protect bees from neonicotinoids.

In addition to the proposed scope of MDA's review of neonicotinoids, I recommend the following additions:

1. As part of a review of neonicotinoids, MDA should investigate options for reducing and restricting the use of neonicotinoid insecticides—and, hence, the risk of pollinator exposure. Minnesota policy-makers and the public would benefit from MDA's perspective on various strategies for reducing the quantity of neonicotinoids introduced into our soil and water.

Strategies for reducing neonicotinoid use may include both voluntary steps (like BMP's, or increasing availability of untreated seeds and plants for farmers and gardeners) and regulatory action (tracking neonicotinoid seed treatments, or classifying neonicotinoids as restricted use pesticides). The review should include MDA's perspective on the opportunities and obstacles associated with various approaches to reducing the use of neonicotinoids.

2. In assessing the benefits of neonicotinoid use in Minnesota agriculture, MDA should take into consideration the growing body of evidence indicating that neonicotinoid seed treatments do not consistently increase yields or profitability when used on major Minnesota crops like corn, soy, canola, wheat, and dry beans. A 2013 study of clothianidin seed treatments in the Midwest found that "the additional cost of an insecticide may not have offered farmers any economic benefits." A 2006 study of thiamethoxam seed treatments in Minnesota found that "at-planting applications of thiamethoxam for soybean aphid control provides little consistent benefit to the grower." Peer-reviewed research on yield impacts of neonicotinoids on Minnesota's major crops must be included in MDA's assessment.

The Minnesota Department of Agriculture's review of neonicotinoids comes at an excellent time, as new laws to protect pollinators move through the legislature and growing numbers of Minnesotans call for even stronger solutions to bee declines. MDA's engagement on this issue is laudable and reflects the agency's bold commitment to pollinator protection. MDA's review shouldn't stop with an assessment of current impact of neonicotinoids, but instead, work to minimize the usage and effects of neonicotinoids in order to protect our state's agricultural system and safeguard pollinators.

Sincerely,