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Date: February 9, 2024

To: Susan Bartow
Chemical Review Manager
Pesticide Reevaluation Division
Office of Chemical Safety and Pollution Prevention Environmental Protection Agency
1200 Pennsylvania Ave NW
Washington, D.C. 20460-0001

From: Pollinator Stewardship Council

Re: Docket EPA-HQ-OPP-2023-0420; Pesticides: Review of Requirements Applicable to Treated Seed and Treated Paint Products; Request for Information and Comments

Thank you for the opportunity to submit comments regarding use of treated seed and the treated article exemption. The Pollinator Stewardship Council represents honey bees and beekeepers of all types, ranging from commercial beekeepers to sideliners to hobbyists, as well as farmers and consumers who depend on honeybees for crop pollination. Commercial and sideline beekeepers in the U.S. provide vital pollination services nationwide and are part of the agricultural system that ensures an abundant supply of fruits, vegetables, and nuts. The economic value of pollination services in the U.S. is estimated at $20-30 billion annually and the work of pollinators is essential to a nutritious food supply.[1] Yet since 2006, it has been a struggle to keep colonies thriving and able to do their jobs as pollinators. Where monitoring has been done, native bees are declining in abundance and diversity. The systemic neonicotinoid pesticides have been studied extensively in laboratory and field settings and found to be the source of both acute kills and multiple sublethal effects that point to these pesticides as one of the primary causes of the high rates of colony loss over the last 15 years. More recent studies on fungicide/insecticide mixes (common on treated seed) show that such combinations pose an even greater threat to pollinators.

US EPA's request for comments on the treated seed issue is a positive step and should lead to changes that benefit pollinators, farmers, consumers, and the environment. In this letter, we provide information on the effects of pesticide-treated seed on pollinators and make recommendations for US EPA regarding regulation of treated seed.

1. Recommended way forward

Beekeepers must be able to operate safely around farmland if we are to be able to contribute our billions of dollars of added value through pollination. If bees can't thrive near the land that grows our crops, we need to rethink how agriculture can be restructured to protect pollinators, soils, water quality, and humans. The Pollinator Stewardship Council recommends the following changes in regulation of treated seed.

We urge US EPA to remove all outdoor uses (including seed treatments) of any systemic insecticide or fungicide from pesticide labels. Because of their persistence, high toxicity, and high water solubility, these chemicals used as seed treatments are the primary reason for the increasing the toxicity of agricultural lands that is threatening not just honey bees, but the agricultural ecosystems themselves. US EPA's risk assessment process does not capture all of the exposures of concern and none of the toxic effects due to chronic, sublethal exposure or exposure to mixtures of pesticides. However, a study of the scientific literature reveals extensive, unmitigated risks of these systemic pesticides used on treated seed to pollinators, beneficial insects, aquatic life, and the broader environment. Numerous research studies also make it clear that the benefits to farmers of using neonicotinoid-treated seeds are vanishingly small. Thus, the significant risks associated with use of these insecticides outweigh any "benefits." If the risks of a specific pesticide use cannot be outweighed by benefits, then US EPA is obligated to cancel those uses. The European Union has done this for neonicotinoids already and has suffered no ill effects. Québec has made neonicotinoid use dependent on need, and has dramatically reduced use without sacrificing yields. It's time for US EPA to follow suit and remove seed treatments as an allowed use for systemic pesticides.

In the interim, we suggest the following changes, while recognizing that these changes will likely have little effect on colony health and survival, but will permit enforcement and create accountability, where currently there is none.

1) Regulate coated seeds as pesticides, with a FIFRA-enforceable label to mitigate acute and chronic impacts on pollinators and other receptors in the agricultural ecosystem, from seed dust drift that contaminates spring pollen to contamination of our farmland and waterways. The hazards associated with use of treated seed must be listed on the label and available to the user of the seed, not just to the user of the product used to treat the seed. The seed bag should come with enforceable "Directions for Use" that clearly spell out how to use the treated seed while minimizing external effects. Beekeepers must have recourse to enforcement by State Lead Agencies for violations of the label that damage their livestock.

2) In order to prevent the creation of hazardous waste sites like the AltEn corn-to-ethanol plant in Nebraska, US EPA must ensure that requirements for safe disposal of excess seed are on the label and are enforceable by state lead agencies. The proposal given in US EPA's **Labeling Instructions for Pesticide-Treated Seed and Pesticide-Treated Paint Products,**[37] is to inform the user to *"Dispose of excess treated seed (such as expired, unused seed) in accordance with applicable laws in your state."* It is unclear how a user of treated seed will know what the applicable laws are, and without an enforceable label, will have little motivation to find out what those laws are.

3) Require tracking of treated seed distribution, sale, and use. The best solution would be to reinstate the data collection efforts used by the USGS in the Pesticide National Synthesis Project.[2]

Below, we provide information relevant to these recommendations.

2. Overview

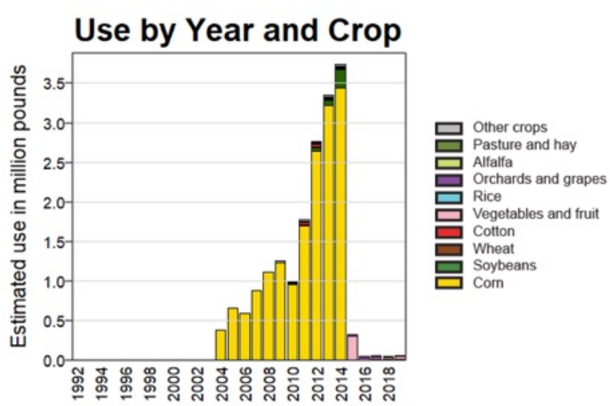
Our members have experienced substantial colony losses due to the use of systemic pesticides, including insecticides and fungicides. With the increased annual colony mortality observed over the last 10-15 years, it is becoming ever more difficult for beekeepers to meet the needs of farmers needing pollination. It is only through heroic efforts on the part of beekeepers that the nation's bee supply remains adequate. But the economic costs of keeping colonies alive and sufficient for pollination are skyrocketing. Inputs of bee feed, replacement queens, package bees, and the work required to split existing colonies to ensure there are sufficient bees for pollination is taking its toll on beekeeping, requiring major changes in operations to keep the bees alive and sending a number of beekeepers out of business. US EPA describes one of its priorities as "protecting pollination services." However, pollination services cannot be protected without protecting beekeepers' livelihood. The impacts extend to farmers as well, when pollination costs increase as a result of a reduced bee supply. If we continue on this path, pollination services provided by commercial beekeepers will be insufficient to meet the needs of agricultural production.

Seed treatments are a primary application route for bee-toxic pesticides, but are currently exempt from regulation under FIFRA as a "treated article." US EPA's failure to regulate treated seed thus puts honey bees, beekeeper livelihoods, farms needing pollination services, and consumers at risk from the impacts of these pesticides. The use of leftover treated seed to produce ethanol at the AltEn plant in Nebraska has led to one of the most extensive, and yet unregulated, hazardous waste debacle of the current era and highlights an urgent need for US EPA to regulate pesticide-coated seeds. In this comment letter, we provide further information from the perspective of beekeepers for US EPA to consider as the Agency moves forward on this issue.

3. Neonicotinoid seed coatings are responsible for a 48-fold increase in toxicity loading in the environment between 1992 and 2014

The insecticides most commonly used in seed treatments are the neonicotinoid insecticides. Treated seeds for commodity crops (corn and soy in particular) account for more than 87% of the use of neonicotinoid insecticides nationwide in 2014, the last year for which data are available (Figure 1).[3] Since 2015, estimates of seed treatment uses are no longer being collected, so we lack a current picture of use.[4] However, little has changed with the major commodity crops, with seed treatment uses continuing.[5]

(a)



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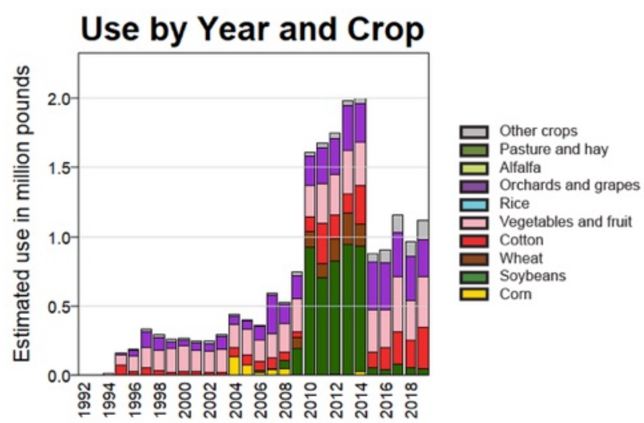

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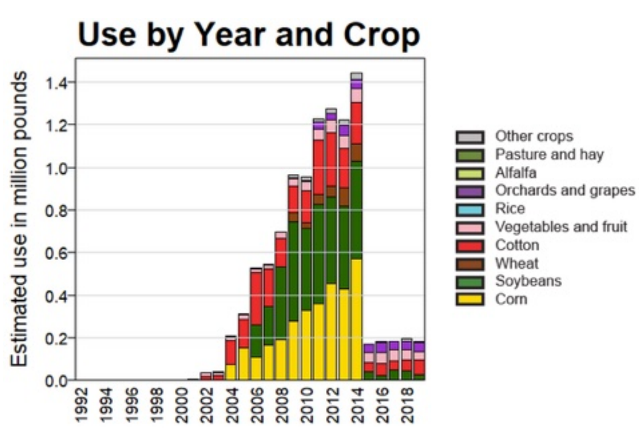

Figure 1: Estimated use of the major seed treatment neonicotinoid insecticides: (a) clothianidin, (b) imidacloprid, (c) thiamethoxam. *Data Source:* Reference 3.

These insecticides do not stay on the seed, but enter the environment as dust abraded from the seed during planting and through runoff from soils planted with treated seeds. These pesticides are among the most acutely toxic insecticides to honey bees ever registered. The high persistence of these chemicals in the environment ensures they remain viable as toxic agents for months to years after they are applied.

In 2019, a method for a screening assessment of Acute Insecticide Toxicity Loading (AITL) over time was developed.[6] The AITL method accounts for the total mass of insecticides used in the US, acute toxicity to insects using honey bee contact and oral LD_{50} values as reference values for arthropod toxicity, and the environmental persistence of the pesticides. The incorporation of persistence (e.g., as measured by half-life in the field and/or soil) of pesticides in this analysis is crucial to understanding the long-term and cumulative ecosystem toxicity beyond the initial pesticide application to a crop. Neonicotinoid residues from seed treatments may be found in the soil for months or even years after planting.[7] For example, neonicotinoid insecticides applied on coated seeds,[8] mature citrus trees,[9] or as soil drenches[10] on annual crops have been found to be effective at killing insects more than 50 days from treatment or planting of treated seeds. For perennial crops such as trees and vines, insecticide residues have been found to persist inside plant tissue for several months to several years.[11]

The AITL screening analysis shows that the types of synthetic insecticides applied to agricultural lands have fundamentally shifted over the last two decades from predominantly organophosphorus and N-methyl carbamate pesticides to a mix dominated by neonicotinoids and pyrethroids. The neonicotinoids are generally applied to US agricultural land at lower application rates per acre; however, they are considerably more toxic to insects and generally persist longer in the environment. Additionally, fields rotated exclusively between corn and soy accumulate pesticide residues in soil, with increasing concentrations over time.[12]

The results of this analysis show a 48- and 4-fold increase in AITL from 1992 to 2014 for oral ($AITL_O$) and contact ($AITL_C$) toxicity, respectively. Neonicotinoids are primarily responsible for this increase, representing between 61 (contact) to nearly 99 (oral) percent of the total toxicity loading in 2014. For comparison, chlorpyrifos, the fifth most widely used insecticide during this time contributed just 1.4 percent of total AITL based on oral LD_{50}s (Figure 2). Oral exposures are of greater concern for pollinators because of the relatively higher acute toxicity (i.e. low LD_{50}s) and greater likelihood of exposure from residues in pollen, nectar, guttation water, and other environmental media.

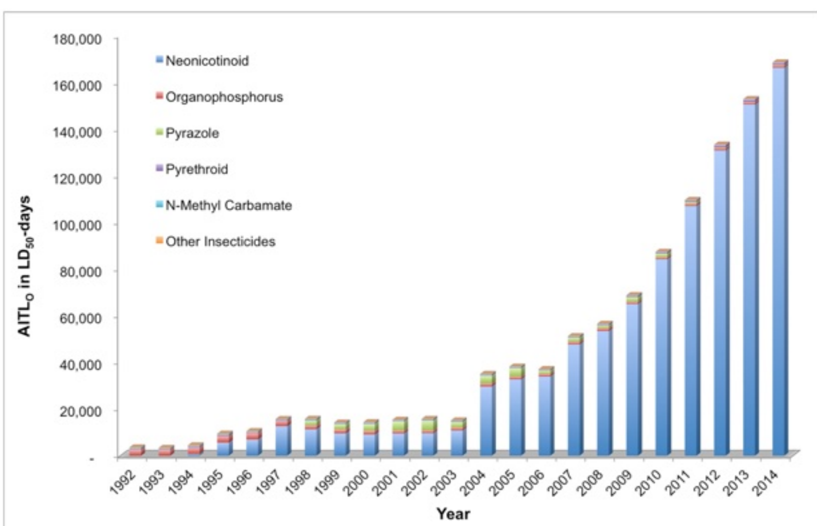

Figure 2: Oral acute insecticide toxicity loading ($AITL_O$) by chemical class, 1992–2014.

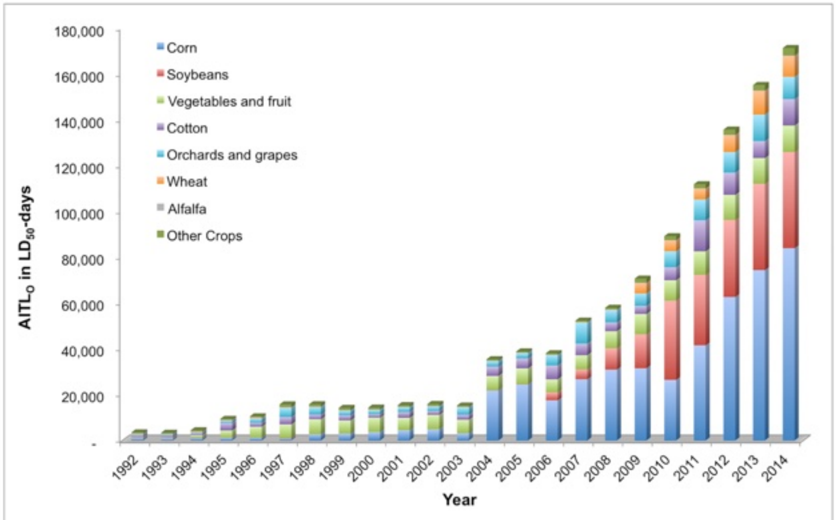

Figure 3: Oral acute insecticide toxicity loading (AITLO) by crop, 1992–2014.

The crops most responsible for the increase in AITL are corn and soybeans, both high-acreage crops planted with treated seeds (Figure 3). An assessment of trends in a similar measure, the oral bee toxic load[13] by region in the U.S. showed the largest increases in the Midwest (a 121-fold increase) and the Northern Great Plains (a 53-fold increase, caused by increased in seed treatment uses of neonicotinoids in corn and soybeans (Figure 4).

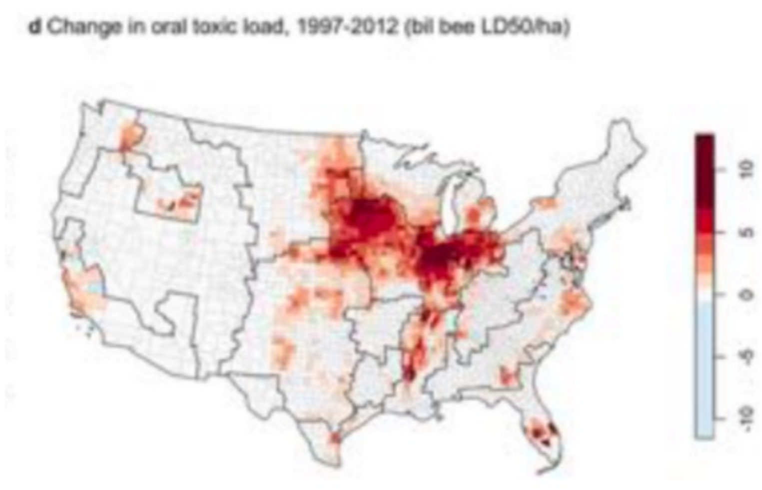

Figure 4: Change in oral toxic load in the U.S., 1997-2012. From Reference 13.

Data are not available to estimate toxicity loading from previous generations of pesticides; however, the toxicity of agricultural lands today is at the highest level since at least 1992, with neonicotinoid insecticides used as seed treatments largely responsible. A 2014 review of the literature (the Worldwide Integrated Assessment on Systemic Pesticides, WIA) documents the extensive damage to pollinators, beneficial insects, soil-dwelling organisms, birds, and aquatic life caused by this unregulated source of landscape toxicity.[14] A 2021 update to the WIA summarizes updates to the body of knowledge on mechanisms of metabolism and toxicity, the effects of mixtures of peseticides, and the distribution, persistence, and degradation of these chemicals in the environment.[15]

Analyses such as those described above are important for US EPA to consider as screening tools for pesticide impacts. Data collection on pesticide use is a critical element of these analyses and should be reinstated as soon as possible.

4. Improper disposal of unused treated seed has created an environmental disaster

The exemption of pesticide-treated seed from registration as a pesticide product by US EPA is responsible for one of the most devastating environmental disasters of our time. In Mead, Nebraska, a corn-to-ethanol plant (AltEn) collected leftover corn seed—much of it treated with insecticides and fungicides—from around the country to transform it into ethanol for fuel. Opening in January of 2015, the facility produced solid and liquid wastes highly contaminated with multiple pesticides. The waste was stored on site at the AltEn property (Figure 5) and sold or given to nearby farmers to spread on their fields as a soil amendment. From 2017-2020, the University of Nebraska-Lincoln Bee Laboratory near the AltEn site had consistent colony losses and **zero percent survivability** of honey bee colonies (~56 colonies, each with 40,000- 60,000 bees). Other beekeepers who are members of the Pollinator Stewardship Council who used to keep bees in Nebraska noticed similar adverse effects on their bees. Adee Honey Farms used to place 12,000 hives in the state, but in recent years experienced more than 95% mortality of the colonies and no longer brings bees to Nebraska.

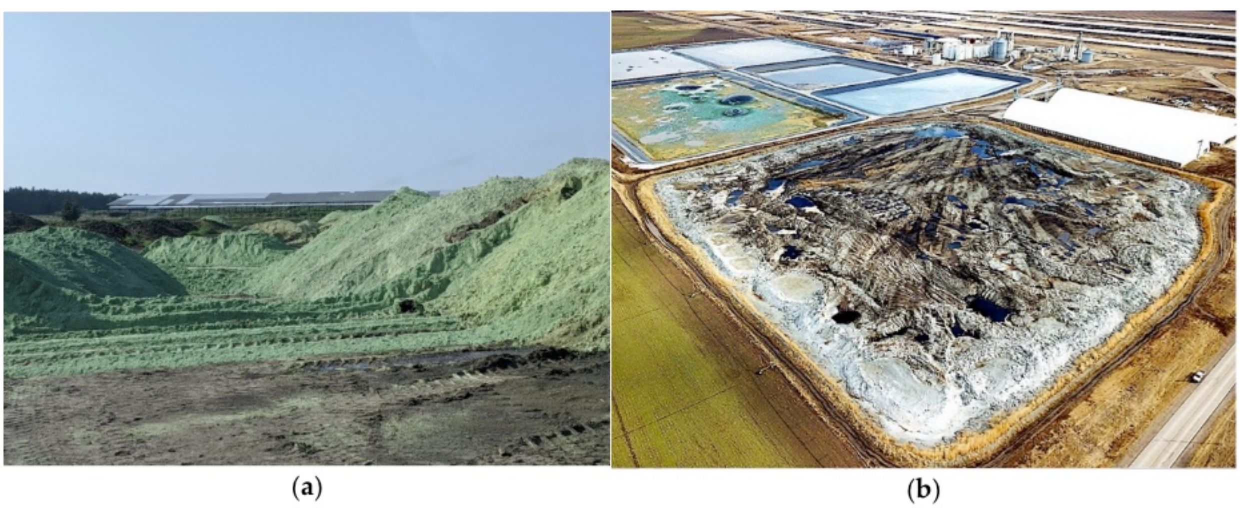

Figure 5: Piles of wet cake at the AltEn facility. (a) The green color comes from dye on the seeds (Photo: Judy Wu-Smart, 2021); (b) Drone view of AltEn plant product storage. The brown color is liquid seepage from the piles (Photo: John Schalles, 2022). From reference 16.

This incident highlights several major concerns regarding regulation of use and disposal of pesticide-treated seed:

AltEn generated tons of pesticide waste from wetcake stockpiles, liquid waste effluent, and soil amendments

Waste products from ethanol production using treated seed have been applied to local farms without farmers' knowledge of the contamination. Currently, there is little to no information regarding the potential residue levels in soil under and near stockpiles or from locations where over 33,000 tons of the pesticide-laden soil amendments were land-applied. We do know the following:

- Clothianidin residues in liquid effluent were as high as 110,000 ppb, while residues present in solid wetcake waste was as high as 550,000 ppb.[17, 18, 19]
- Research from the Wu-Smart lab shows soil collected in 2021 (two years after the wetcake was applied in 2019 to a nearby farm) still had extremely high loads of neonicotinoids (as high as 20,000 ppb) and fungicides (as high as 25,000 ppb).

Unfortunately, the potential impacts to soil health, crop success, and beneficial organisms (decomposers and natural enemies) as well as impacts on local residents are not currently being examined by state or federal regulatory agencies. The concentration of pesticides in wildflowers, contaminated soils, waterways surrounding the facility, and fields treated with the wetcake waste is unknow. NDEE and the industry partners in charge of clean-up have focused all efforts on site, with minimal testing. Independent researchers who have been sampling for the past three years are out of funds for continued monitoring.

Waste sites release pesticide-contaminated airborne particles into the air at toxic levels

In 2018-19, specialized traps designed to capture airborne particles around the impacted area indicate neonicotinoid insecticide (clothianidin) residues were present at high levels (maximum 520 ppb) in samples collected approximately one mile away from AltEn.[20] By comparison, samples collected 2-3 miles farther away yielded significantly lower pesticide concentrations. While not designed to assess airborne exposure risks, the residue levels found indicate inhalation exposure concerns for wildlife and humans spending time near the site. Pesticide-laden air particles or dust may settle, potentially contributing to contamination of indoor surfaces, surface water, soil, and plants. In 2022, further testing showed clothianidin was detected in air (at 59 mg/m^3) and imidacloprid was detected in dust (at 407 ng/g) collected from residential homes nearby. A study evaluating the urinary levels of neonicotinoid insecticides in people living near the AltEn site showed detectable levels of neonicotinoids and/or their metabolites 10 out of 30 people living in the vicinity of the AltEn site or near a field treated with wet-cake from the plant.[16] Several of the study subjects had levels significantly exceeding levels typically found by the CDC attributed to consuming neonicotinoid-treated produce.

These measured levels in people living near the site are higher than US EPA's LOAEL values in animal studies, suggesting that adverse effects are possible. While some potential effects at these concentrations are minor (i.e. weight changes) and may not constitute an immediate concern, other studies indicate substantial impacts on reproductive functions and on the health of developing children. Exposure to neonicotinoid insecticides has been noted to cause potentially severe impacts in animal studies (i.e. stillbirths, cognitive delays) associated with neonicotinoid/fungicide exposure.[21] What type of harm does US EPA consider "acceptable?" What effects would be considered "unacceptable harm"? The people living in Mead, NE want to know, and neither the regional US EPA officials nor the state regulators (Dept of Agriculture and Dept of Environment and Energy) are providing the answers.

Systemic pesticide pollution in plants is not addressed in any regulatory framework

Systemic pesticides, such as the neonicotinoid insecticides mentioned previously, can translocate to all parts of a treated plant, including the root system, making them popular chemical options for seed coatings. However, the systemic action of these chemicals also increases the risk of leaching and off-target movement. Systemic pesticide residues in contaminated water and soil may be picked up by nearby vegetation and expressed in leaves, nectar, and pollen where bees and other wildlife may become exposed. Current monitoring and mitigation efforts in water, soil, and air (which are separately regulated) may not be fully considering the systemic movement across these different matrices and uptake of residues into nearby plants. Further, when the University of Nebraska Bee Lab asked for US EPA assistance, it was noted that US EPA does not have a team or division to deal with pesticide pollution in plants. There are four major ways wildlife may encounter pesticides, through air, water, soil, or plants. There are robust regulations to protect against water, air, and soil pollution but nothing for plants. How can the US EPA be effective if it isn't addressing one of the four major routes of exposure? US EPA's stated mission is to ensure that "Americans have clean air, land and water", however with systemic pesticides that can move readily from air, water, and soil into vegetation, US EPA must now also consider "clean plants" to be part of their mission.

Lack of federal regulations causes confusion at state levels

There have been several questions and discussions regarding the proper designation for the contaminated byproducts, also referred to as "wetcakes" produced by AltEn. During production, AltEn produced ~100,000 gallons of pesticide-laden effluent per day and there was over 110,000 tons (or 220,000,000 pounds) of pesticide-laden wetcake on site. After the AltEn closure, in Feb 2021, the site contained ~ 150 million gallons of highly contaminated wastewater and 85,000 tons of pesticide-laden wetcake that needed to be disposed of. Not long after the plant was closed, 4 million gallons of wastewater was released into local surface waters when a pipe broke. The wetcake pile has been covered with a cement-clay-polyester cap to reduce runoff. The cleanup effort, costing over $28 million to date, continues today.

For several years, AltEn employees disputed that their company produced waste at all and therefore does not need to comply with hazardous waste requirements because their wetcake byproducts were economically viable and could be used by farmers as both liquid and solid soil conditioners.[22] From the NE Dept of Ag investigation reports, it is estimated that ~33,400 tons (or 66,800,000 lbs) of the pesticide-laden wetcake was distributed to local farms in the Mead area in 2018-2019 without farmer's knowledge of pesticide contamination, because no pesticide testing was required when AltEn obtained the initial permits to utilize these byproducts as soil conditioners. The exemption from FIFRA labeling of treated seeds made it possible for the pesticide-coated seeds to be "disposed" through an industrial process without pesticide monitoring, testing, or oversight.

Nebraska Department of Agriculture issued a "stop sale and use" in May 2019 based on pesticide testing results that showed an application of their wetcake at "20 tons per acre as recommended would be 85 times higher than the maximum annual field load allowed by a typical registered pesticide label." Residents living near farms where wetcake was applied reported acute health concerns from respiratory issues, swollen eyes and throats, and even sick wildlife and pets.[23] However, state regulators initially assumed these issues were related to potential mycotoxins and they were unaware of the presence of pesticides because these seeds are not "regulated" like typical pesticides.

The disconnect between FIFRA and RCRA allows highly toxic pesticide-laden byproducts to avoid classification as hazardous waste

In 2020, NDEE classified the AltEn wetcake as a "special waste", noting that the pesticide residues found could persist and were known to be "detrimental to humans, birds, mammals, bees, freshwater fish, freshwater invertebrates, estuarine/marine fish, and/or estuarine/marine invertebrates." The amount of pesticide that entered waterways near the facility and wetcake fields is unknown and continues to be a concern. More recently, the remaining wetcake has been designated *non-hazardous* waste following The Resource Conservation and Recovery Act (RCRA) guidance.[24] As a result, cleanup requirements, containment, and procedures are not applied to agricultural chemicals, like the pesticides applied to seed coats.

US EPA states "The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) governs the sale, distribution and use of pesticides in the United States. Pesticides are regulated under FIFRA until they are disposed, after which they are regulated under the Resource Conservation and Recovery Act (RCRA), which ensures responsible management of hazardous waste and non-hazardous solid waste."[25] Under RCRA, the industrial waste guidance states, "A waste is determined to be a hazardous waste if it is specifically listed on one of four lists (the F, K, P and U lists) found in title 40 of the Code of Federal Regulations (CFR) in part 261." In 2022, US EPA released their assessment of the potential effects of neonicotinoids on endangered wildlife which reviewed over 1,700 listed endangered species and 800 critical habitats in the US.[26] The report concluded that neonicotinoids (clothianidin, thiamethoxam, and imidacloprid) would "likely adversely affect 67- 79" of the listed species as well as 56-83% of the designated critical habitats. However, pesticides like neonicotinoids are not included in any of the four RCRA lists despite that the fact neonicotinoids are known to have highly toxic and detrimental impacts to wildlife and the environment.[27]

No clarity on how ongoing disposal will be handled

AltEn self-proclaimed they were receiving 98% of all surplus outdated treated seed in North America. AltEn was closed by regulators in 2021, so where and how are seed companies disposing of these outdated surplus seeds now? Disposal guidance remains unclear. Several states, including MN, NE, NY, CA, VT, and NJ, have tightened restrictions on processing of treated seed, but there is no consistency across states, and federal guidance is lacking.[28]

For instance, when in the life of a pesticide-treated seed does it become hazardous waste when it is exempt from pesticide regulations after the initial chemical application? The federal exemption excludes these products from any requirements to monitor, test, and contain such materials as hazardous waste, when they are in-fact quite hazardous. This is a serious problem for proper disposal of unused pesticide-treated seeds. We note that a simple solution to this problem is to prohibit the use of seed treated with neonicotinoid insecticides or other systemic pesticides.

In sum, "Agricultural-based industries" and the use of agricultural products or waste-to-fuel industries are becoming more popular as innovative ways to reuse or recycle waste. But the regulations for agricultural vs industrial products are distinct, and there is no crosstalk between regulatory departments when agricultural products and associated pesticide chemicals are used in industrial processes. The inconsistencies between "agricultural" versus "industrial" standards have allowed this unprecedented disaster to occur. The clean-up process continues to cause concerns. US EPA must re-examine these inconsistencies, the disconnects, and limited enforcement capacity across agencies, and address the organizational silos our regulatory system has become.

5. US EPA's risk assessment process underestimates risks to pollinators

A comprehensive assessment of the risks to honey bees associated with use of seed treatments requires a thorough assessment of toxicity of the chemicals as well as exposure routes. US EPA has systematically underestimated risks to honey bees by ignoring certain types of exposures, with toxicity endpoints based primarily on acute toxicity, and failing to acknowledge and require data on chronic toxicity caused by sublethal doses. The current risk assessments already describe effects on honey bees and the environment that are destructive to the functioning of agricultural ecosystems. And yet, they are missing critical components for a comprehensive picture of toxicity and exposure. A recent review highlighted these limitations.[29] Below we describe some of the missing or misdirected components of US EPA's risk assessment process that highlight the vast extent by which these effects are underestimated.

Important exposure routes are missing from the risk assessment

The high water solubility and persistence of systemic pesticides is responsible not only for uptake by plant roots, but also for long-term unintended effects on non-target organisms due to dissolution and subsequent release into the environment.[30] Planting of treated seed results in release of approximately 90% of the pesticide coating to the environment.[31] A further 2-3% is abraded off the seed and released as dust during planting. The residual 2-3% of the pesticide remaining in the seed is taken up by the plant and expressed in the plant tissue, including pollen and nectar (see Figure 8, from Reference 31).

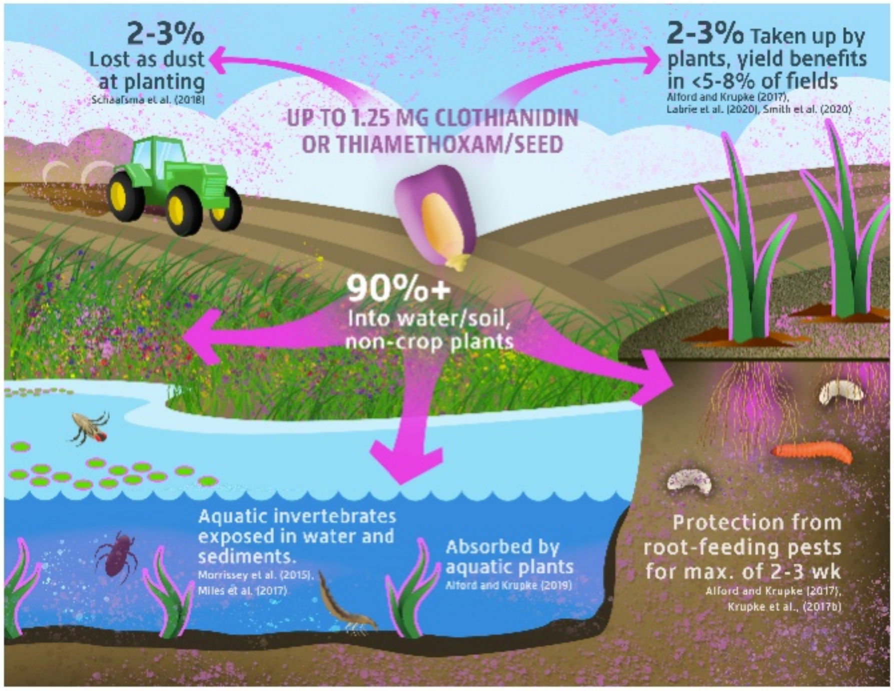

Figure 8: From Reference 31. The planting of seed treated with systemic pesticides results in more than 95% of the pesticide being released to the environment.

The high mobility and acute toxicity of these chemicals to arthropods, as well as their ability to cause sublethal effects results in a multitude of non-target impacts,[14, 15] some of which are described below.

The assumption that the dominant routes of exposure are only through contact with treated foliage and through consumption of contaminated pollen and nectar omits several potentially high-concentration exposure routes, including dust drift from the planting of treated seed, consumption of guttation water from treated plants, and consumption of water from contaminated soils and waterways. Dust from the planting of treated seed is well-known as a particular problem for beekeepers, as corn planting often coincides with the bloom time of willows and other field-side plants that are attractive to pollinators.[32]

Beekeeper and President of the Pollinator Stewardship Council Steve Ellis has experienced such kills on a regular basis in Minnesota when dust from spring planting of treated seed drifts off of the planting rig onto blooming field-side weeds, on which bees typically forage at that time of year. As an example, in May of 2013, Ellis had a massive acute poisoning of his bees, with bees observed dead in front of the hives, as well as crawling on the ground unable to fly, both close to the hives and up to several hundred yards away from the hives. Some exhibited trembling and twitching, lying on their backs unable to right themselves (Figure 6 and video referenced therein). These effects were observed on the same day that a field adjacent to Ellis's apiary was planted with corn seed treated with clothianidin. Unlike many such incidents, this one was reported to the state lead agency (Minnesota Department of Agriculture)[33] and Bayer Crop Science, both of whom investigated and wrote up a report on the incident that was submitted to US EPA.[34]

Bees had been gathering nectar and pollen primarily from willow flowers adjacent to the recently planted field, as they were the only blooming plant at that time of year. Stunned or immobilized bees were observed in large numbers on the willow flowers. Twelve samples of dead or dead and dying bees were found to have an average measured concentration of clothianidin of 7 ppb, with a range from 3.2 to 12.3 ppb. Six samples of live, but impaired bees had an average concentration of 6 ppb of clothianidin, with a range from 1.4 to 8.8 ppb. Willow flower blossoms were found to contain clothianidin at 38.7 ppb, and three pollen samples from beehives were found to contain clothianidin at 32.8 ppb, 41.7 ppb, and not detected.

Figure 6: Dead and dying bees found a few hours after bees foraged on willow pollen contaminated with dust from the planting of corn seed. Bees were observed dead in front of the hives, as well as crawling on the ground unable to fly. Some exhibited trembling and twitching, lying on their backs unable to right themselves. Two dead queen bees were found on the ground as well. Dead and dying bees were observed at distances of several hundred yards away from the hives. Immobilized bees were clinging to willow flowers, unable to fly and moving very slowly. For video, see http://youtu.be/xxXXaILuK5s

The investigation concluded that "*Since most samples of dead or dying bees contained residues >5 ppb of clothianidin or thiamethoxam, it can be concluded that neonicotinoid exposure likely contributed to the observed mortality.*"

Ellis notes:

> *There were 1,312 hives of honey bees present in the holding yard on May 7, 2012. The replacement value of these bees at this time of year (if you could get them at all) would be $155 min. per hive or $203,360. Strength and long-term viability of the hives is in question both for the upcoming honey production season as well as next season's pollination contracts. Strength and viability are critical factors for both endeavors. All of the hives exhibited the unusual mortality symptoms described.*

This exposure was not a one-time event. Ellis reported seed-dust kills to MDA in 2010, 2012, 2013, 2014, 2017, and 2022. Samples taken during these assessments demonstrated the presence of neonicotinoid insecticides in living and dead bees. However, because of the treated seed exemption, the MDA took no action, concluding: "*Treated seed is exempt from the provisions of FIFRA under 40 CFR 152.25, also known as the "Treated Article Exemption". Close investigation with no action.*" In other words, there is no recourse for beekeepers experiencing kills from these types of exposures.

US EPA states in the Final Bee Risk Assessment for Clothianidin and Thiamethoxam,[35] that "*Potential exposure via abraded seed coat dust is being addressed through separate ongoing development of best management practices.*"

We note the extensive work done by the Corn Dust Research Consortium,[36] which appears to have not been incorporated into US EPA's exposure assessment for pollinators. In the **Labeling Instructions for Pesticide-**

Treated Seed and Pesticide-Treated Paint Products,[37] the only "best management practice" proposed by US EPA is to place the following advisory language on the label:

ADVISORY DUST-REDUCING TECHNIQUE

Fluency agents are recommended to be applied to seed after pesticide treatment prior to the planting.

However, neither the Corn Dust Research Consortium nor other researchers[38, 39] found the use of fluency agents successful for managing dust during planting.

By not assessing exposures from planting dust on field-side blooming plants, US EPA underestimates risks from use of treated seed. Additionally, US EPA does not conduct an economic analysis to account for the associated costs to beekeepers of replacing lost colonies, failing queens, impaired pollination capacity, and reduced honey production.

"Sublethal" effects are not considered

In addition to high acute toxicity, the neonicotinoids have been shown to have a range of sublethal effects on honey bees and other pollinators at environmentally relevant concentrations. We note here that the term "sublethal" only means that honey bees do not die within a few days of exposure to "sublethal" concentrations of neonicotinoids; however, these concentrations are not without effects on the longevity and viability of honeybee colonies, which is the measure of greatest importance when considering pollination services and beekeeper livelihood. Even low levels of exposure may be having an impact on pollinators, yet toxicity tests for long-term sublethal exposures are not required by US EPA for registration purposes.

Sublethal effects of the pesticides used as seed treatments include impairment of immune function,[40, 41] reduced queen lifespan and fertility,[42, 43, 44, 45, 46] decreased sperm viability in drones,[47, 48] reduced brood survival,[49] interference with foraging ability[50, 51, 52] and navigation,[53] and altered in-hive behaviors.[54] Recent work indicates that sublethal exposure can affect reproduction in native bee species over months to years.[55, 56, 57, 58]

Recent work on genetic effects is now providing mechanistic possibilities for observed sublethal effects.[59] Honey bee dosing studies at field-relevant concentrations and subsequent analysis of transcriptional alterations of selected genes indicated that *Vitellogenin* (related to foraging activity) showed a strong increase on exposure to neonicotinoids. The *creb* and *pka* transcripts were down-regulated, an effect that may be causal in the observation of decreased long-term memory formation. US EPA needs to evaluate possible mechanisms for observed adverse effects.

Bees are often exposed to low levels of pesticides for long periods of time, suggesting that the observed sublethal effects of neonicotinoid insecticides may be the primary drivers of colony decline. The Druckrey-Küpfmüller equation is key here, providing insights into the relationship between the exposure time and concentration of a toxicant and its effects on an organism. This mathematical model proposes that the product of the concentration of a toxic substance (C) and the time (t) of exposure to that substance is constant for a specific effect level, encapsulated in the formula $C^n \times t = k$, where n is a constant that can vary depending on the toxicant and the biological system, and k is a constant representing the level of effect (e.g., the threshold for a toxic response). *This equation underscores the fundamental principle that the severity of a toxic effect is not solely dependent on the dose or concentration of a substance, but also on the duration of exposure.* It highlights the critical balance between concentration and time in determining toxic outcomes, providing a foundational concept for assessing risk to pollinators, where exposure time can be greater than the lifetime of a bee. This means that while a lower concentration of a pesticide might not result in any observable bee kills, it may still pose significant risks to individual bees and especially to the colony at large if the exposure time is prolonged.[60]

Use of the "colony-level" exposure estimate fails to account for effects on key castes of bees

The use of a "colony-level" exposure that combines nectar and pollen consumption into a single dietary metric for the entire colony was introduced between the time the Preliminary Bee Risk Assessment to Support the Registration Review of Clothianidin and Thiamethoxam was published in 2017 and the Final Bee Risk Assessment to Support the Registration Review of Clothianidin and Thiamethoxam was published in 2020.[61] In general, Tier I assessments indicated that, for bee-attractive crops, most uses exceeded Levels of Concern for acute and chronic risks to individual bees (See Table 6.1 in the risk assessment). Tier II colony risks varied depending on the application method and crop uses. (See Table 6.2). The Tier II risk assessments in the Final Bee Risk Assessment incorporated NOAEC/LOAEC values from colony feeding studies for thiamethoxam and clothianidin, creating a "nectar-equivalent" colony-level dose.

In plants grown from treated seed, the concentrations of neonicotinoids are much higher in pollen compared to nectar. This means that bees whose diet is heavy on pollen (nurse bees and brood) will have higher exposures to neonicotinoids than foragers or wax-producing bees, which eat predominantly nectar (Figure 7).

Table 1. Nectar and pollen consumption rates by caste and task (from BeeREX) and assumptions for converting measurements from Colony Feeding Study (CFS) to number of individuals relevant to BeeREX larval and adult castes/tasks.

Life stage	Caste or task in hive	Average age (d)	Nectar consumed (mg/d)	Pollen consumed (mg/d)	Number of individuals/X[a]
Larval	Worker	1	0	0	total larvae/5
		2	0	0	total larvae/5
		3	0	0	total larvae/5
		4	60	1.8	total larvae/5
		5	120	3.6	total larvae/5
	Drone	6+	130	3.6	0[c]
	Queen	1	0	0	0[b]
		2	0	0	0[b]
		3	0	0	0[b]
		4+	0	0	0[b]
Adult	Worker (cell cleaning and capping)	0-10	60	6.65	Total adults/3
	Worker (brood and queen tending, nurse bees)	6 to 17	140	9.6	Total adults/3
	Worker (comb building, cleaning and food handling)	11 to 18	60	1.7	Total adults/3
	Worker (foraging for pollen)	>18	43.5	0.041	((Total adults)/4)*1/4
	Worker (foraging for nectar)	>18	292	0.041	((Total adults)/4)*3/4
	Worker (maintenance of hive in winter)	0-90	29	2	0[d]
	Drone	>10	235	0.0002	0[c]
	Queen (laying 1500 eggs/day)	Entire life stage	0	0	0[b]

[a] Denominator distributes the number of individuals equally across ages (column 3) for each respective hive caste/task (column 2).
[b] Queen does not consume pollen and/or nectar directly but rather royal jelly; therefore, her contribution to total colony pollen/nectar consumption is negligible; therefore, value set to zero.
[c] Number of drones considered low in comparison to worker is considered negligible therefore, value set to zero.
[d] Since CFSs were carried out in summer, it is assumed that no winter bees are present.

Figure 7: Table 3 from *Attachment 1 to the Final Bee Risk Assessment for Clothianidin and Thiamethoxam*.[62]

The result of the "colony level" approach to estimating a dose of contaminated pollen is to average the effects of the exposure over all bees in the colony by assuming that every bee has the same importance to colony survival.

However, this critically underestimates the role of the highest exposed bee caste, the nurse bees. Besides the queen, nurse bees are the most important caste of bees for ongoing colony survival.

Nurse bees play a critical role in feeding and maintaining the brood, requiring high-functioning hypopharyngeal glands to produce sufficient brood food for proper larval development. As noted in reference 63:

> *Larvae grow exponentially over 5–6 d (Thrasyvoulou and Benton 1982, Winston 1987) and even a short period of nutritional deprivation can impact their assessed value as potential queens (Sagili et al. 2018) and result in developmental changes and dwarfism in adults (Nelson and Sturtevant 1924, Jay 1964).*

Recent work has shown reduced size and irregular shapes of the ancini in the hypopharyngeal glands of bees fed sublethal concentrations of thiamethoxam[64] and imidacloprid,[65, 66] an effect that reduces the capacity of the nurse bee to produce brood food. Other work demonstrates that field-relevant concentrations of thiacloprid or clothianidin reduced the acetylcholine level in brood food made by nurse bees, resulting in adverse effects on brood development.[67] These effects in turn limit the colony's capacity to produce viable, long-lived queens and functional worker bees. By focusing the "colony level assessment" on all bees in the colony rather than the most important bees for colony survival, US EPA has significantly underestimated the risks associated with neonicotinoid exposure from seed treatments.

The study on which the Tier II assessment is based (MRID # 50478501) also has serious limitations.[68] Specifically, the "endpoints" were solely based on counts of eggs, brood, and worker bees from July 14 through October 18, about three months. Overwintering survival was not measured, nor was queen survival into the following season or queen longevity. The Sandrock study that was dismissed as the basis for the sublethal risk assessment was a more thorough assessment of the risks of chronic exposure and resulted in a significantly lower LOAEC and NOAEC.[69]

Honey bees do not represent a viable surrogate for other bees

US EPA's risk assessment process for pollinators assumes that the European honeybee can represent all other pollinators. This is a faulty assumption. The imported honeybee has an entirely different lifestyle than native bees or other pollinators. While the honeybee lives in colonies above the ground, native bees are mostly solitary and live near or in the ground. Because of the importance of these other bees to the pollination of crops, European countries assess the risks of pesticides to honeybees, native bees, and bumble bees separately. USEPA claims it does not have reliable data to assess the risks of pesticides to native bees and bumble bees, but the agency has made little to no effort to obtain reliable data for other bee species exposed to pesticides. In this case, EPA should contact its European counterparts to learn more about their risk assessments for other pollinator species. In the absence of data, uncertainty factors could be generated based on available data.

Mixtures must be addressed

US EPA's required testing of active ingredients in isolation is insufficient to determine the actual field toxicity of treated seeds. Seed treatments are most frequently a mixture of an insecticide and one or more fungicides.[70] There are a number of patents filed by registrants touting the enhanced insecticidal activity due to the synergistic effects of combinations of pesticides, specifically fungicides and insecticides.[71] There is also a growing body of research that explores the mechanisms of synergistic interactions that impair colony health, by directly affecting reproduction and development, by disabling detoxification mechanisms in the honey bee or by increasing the availability of the active ingredients.[72, 73, 74, 75, 76, 77, 78, 79, 80]US EPA has failed to assess the risks associated with these combinations of pesticides and thus underestimates the risks associated with use of seed treated with combinations of fungicides and insecticides.

Long-term solutions to repairing the risk assessment process

Creating a comprehensive ecological risk assessment for pesticides will take time, and time is something we do not have. Our bees and our ecosystems are failing now. The best solution for turning the tide is to prohibit use of systemic insecticides and fungicides as seed treatments. In the future, US EPA's risk assessment methodology must account for all exposures, as well as chronic effects that impair colony health from sublethal, but field-realistic doses of pesticides. We note that US EPA does not have to reinvent the wheel here. Others have thought and written extensively about how to conduct a more comprehensive risk assessment for pollinators.[29, 60] To summarize:

1. Require validated long-term laboratory toxicity tests with sublethal and field-relevant doses of pesticides. Develop meaningful endpoints and utilize new technologies to assess them.

2. Incorporate scientific literature studies into the risk assessment process.

3. Ensure all assumptions are based in science and backed by data. Consult with entomologists to check that assumptions agree with biology.

4. Require Tier II studies to be run for sufficient time to assess long-term effects such as overwintering survival and queen fecundity.

5. Require toxicity testing of commonly used mixtures of pesticides and co-formulants to look for synergistic effects.

6. Test native bees as well as honey bees or add an uncertainty factor for natives based on existing data.

7. Set a best-estimated level for the exposures for which data are limited. Currently US EPA assumes exposures from dust from planting seed, guttation water, soils, and surface water are zero. They are almost certainly not zero, so use existing data on concentrations and exposure routes to set a best-estimate of exposure.

8. Require post-approval monitoring of pollinator and ecosystem effects.

6. The risks of treated seed in crop production exceed the benefits

US EPA's "risk-benefit" assessment presents only one side of the economic picture. The "risks" of a particular pesticide use are presented as adverse effects, but the economic "benefits" of not using the pesticide are not calculated. It is worth remembering that pollination is essential to agriculture, to the tune of an estimated $34 billion dollars in 2012,[81] with bee-pollinated crops responsible for approximately one-third of the total human diet.[82] Any activity that threatens pollination threatens our ability to produce food. In the words of B.N. Gates:[83]

> *[H]e may fertilize and cultivate the soil, prune, thin and spray the trees, in a word, he may do all of those things which modern practice advocates, yet without his pollinating agents, chief among which are the honey bees, to transfer the pollen from the stamens to the pistil of the blooms, his crop may fail.*

The only economic "benefits" (in dollars) included in US EPA's analysis are those that might be associated with use of the pesticide on specific crops. The analysis fails to assess benefits from allowing the ecosystem to function naturally. It also fails to assess costs to beekeepers and the ecosystems at large associated with adverse effects of using the pesticide. This lopsided assessment is rigged to ensure continued sales for pesticide manufacturers, at the expense of our pollinators, beekeepers, and agricultural ecosystems.

Pollinators increase soybean yields, with billions of dollars in additional benefits possible

In soybeans, the presence of pollinators has been shown to increase yields substantially. Over a 3-year study, field trials revealed a significant increase in yield when honey bees had access to flowers: 5,565 kg/ha for caged plots with honey bees and 5,201 for open plots, compared to caged plots without honey bee hives, which yielded 4,926 kg/ha. [84] A meta-analysis of recent available studies indicates that soybeans grown in the presence of pollinators exhibit a 21% increase in yield on average over the various studies, typically by increased number of pods per plant and/or increased number of seeds per pod.[85] In 2022, the total U.S. production of soybeans was 4.27 billion bushels with a value of $61 billion.[86] A 21% improvement in yield would be worth $12.8 billion. The value of pollination and the resulting yield enhancement must be included in US EPA's cost-benefit assessment.

The "benefits" to farmers from use of seed treatments have been shown to range from minimal to non-existent

A number of studies indicate that seed treatments provide minimal to no benefit to the farmers for sunflowers,[87] soybeans,[88, 89, 9091] and corn,[100, 92, 93, 94,90] primarily because the target pests are either not common or do not cause significant yield reductions.[31] Indeed, US EPA assessed the benefits of seed treatments in soybeans and concluded:[95]

> *Published data indicate that in most cases there is no difference in soybean yield when soybean seed was treated with neonicotinoids versus not receiving any insect control treatment.*

In the European Union (EU), where outdoor uses of neonicotinoids were banned in 2018, yields have remained robust. In fact, the June 9, 2023 report on EU Rapeseed production indicates that harvested area is up eight percent above the 5-year average.[96] For EU sunflowers (another crop that utilizes treated seed), the January 12, 2024 report indicates that yields were also up eight percent above the 5-year average.

In April of 2019 in Québec, Canada, the Department of Environment made it mandatory for farmers to obtain a written recommendation from one of the Province's 3,300 registered agronomists in order to use neonicotinoid-treated seed.[97] Before these restrictions, the vast majority (80-90%) of the corn, soybean, and canola acreage (approximately 2 million acres) in Québec were planted with seed coated with the neonicotinoids clothianidin, imidacloprid, or thiamethoxam. Over 90% of surface waters tested in agricultural areas were contaminated with residues of these insecticides. The new "verification of need" requirement resulted in substantial reduction in use of neonic-treated seeds. Seed producers responded quickly to the demand by producing seed without neonicotinoids, and as early as 2019, most corn and soybean seeds used in Québec were no longer treated with neonicotinoids. In 2021, Québec farmers used neonicotinoids on less than 0.5% of their corn fields and not at all in soybeans. As a result, neonicotinoid contamination of surface waters decreased significantly, but crop yields remained constant, with no crop failures attributed to the lack of neonic-treated seeds.

Use of treated seeds has resulted in increased late-season pest infestations in soybeans

Use of treated seeds has also increased farmers' cost for insect control. Neonicotinoids are broad-spectrum insecticides that can affect non-target insect populations, including natural pest predators and parasitoids. Recent research demonstrates how neonicotinoids, when applied to crops or soils, are absorbed and transferred through various trophic levels within the soil food web, disrupting natural predator-prey relationships and allowing the expansion of secondary pests previously controlled by natural enemies. A recent study showed a 5% decrease in soybean yield and a 19% decrease in crop density resulting from increased slug populations in soybean fields caused by a decrease in population of beetles that typically prey on slugs.[98] The slugs can tolerate neonicotinoid exposure, but the beetles cannot, and their population decreased from consumption of neonic-contaminated slugs, allowing the slug population to expand.

Such secondary effects have also been observed as outbreaks of soybean aphids in fields grown from neonicotinoid-treated seed. Aphid predators such as lady beetles are killed or their populations substantially reduced early in the growing season from neonic exposures from soil moisture, prey, and plant exudates, thereby allowing aphids to reproduce unchecked. Research has shown that at a dose equivalent to an LC_{10}, the net reproductive rate in lady beetles drops by half.[99] Reduced predator populations in turn leads to an aphid population boom and increased use of late season insecticide applications (typically high toxicity pyrethroids or organophosphates) to control soybean aphids, with additional costs to the farmer and to beekeepers with colonies near these fields. This is ironic, since one of the stated benefits of neonicotinoids is that it will "reduce" the use of more dangerous insecticide chemistries. And yet, we see the opposite effect.

A 4-year experiment that integrated co-production of corn and watermelon was managed using IPM and pest thresholds to determine the need for treatment, rather than preemptive treatments, to preserve beneficials.[100] Pests rarely reached economic thresholds, resulting in 95% lower insecticide use (97 treatments in conventional fields versus 4 treatments in IPM-managed fields, respectively, across all sites, crops, and years). Lack of a neonic seed treatment in corn did not result in a decrease in yield, and use of IPM methods in watermelon resulted in 26% higher yields over conventional pest management, attributed to higher visitation of flowers by wild bees. IPM methods that involve scouting for pests and only treating when thresholds are exceeded allow native predators to thrive and are also critical to resistance management in the pest.[101] These examples demonstrate that creating a favorable and safe environment for pollinators and beneficial insects by eliminating use of bee-toxic neonicotinoid insecticides is a better economic bet than planting with neonicotinoid-treated seeds that poison the pollinators and the beneficial insects.

7. Why the treated article exemption should not apply to treated seeds

Treated seeds fall under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) treated article exemption. Under federal law, "treated articles" are pesticides that are exempt from registration requirements pursuant to FIFRA section 25(b). An article or substance treated with pesticide qualifies for the exemption if: (1) the incorporated pesticide is registered for use in or on the article or substance, and (2) the sole purpose of the treatment is to protect the article or substance itself. (40 CFR s. 152.25.). However, the treated article is the seed, but the seed sprouts to become a living plant which is also "protected" by the pesticide(s). The seed and the plant are not equivalent. In joint discussions with Canada regarding harmonization of pesticide regulation between the U.S. and Canada, the regulatory directive DIR2003-02 describes the terminology used in FIFRA for treated seed:[102]

> *The term "for the protection of the [seed] itself" means that the pesticidal protection imparted to the treated seed does not extend beyond the seed itself to offer pesticidal benefits or value attributable to the treated seed. Unless claims of pesticidal benefit or value attributable to the treated seed and extending beyond the treated seed are made in conjunction with the distribution or sale of the treated seed within the U.S., the EPA will presume that the seed will have been treated "for the protection of the seed itself."*

Indeed, seed companies specifically advertise treated seed as protection for *plants*, not just seed. For example:

> From Pioneer *re* Lumialza seed treatment:[103]
> *Lumialza provides >80 days of root protection in all root zones against a wide range of nematodes . . .*
>
> From Syngenta *re* Cruiser seed treatments:[104]
> *A combination of Cruiser® 5FS seed treatment insecticide and Maxim® Quattro seed-applied fungicide, CruiserMaxx® Corn Seed Treatment protects against early-season insects and seedborne and soilborne diseases.*
>
> From Bayer *re* Gaucho 600 seed treatment:[105]
> *Key Benefits*
> - *Protection from thrips and plant bugs*
> - *Keeps aphid populations below the economic threshold for up to 65 days*
> - *Reduces early season damage caused by bean leaf beetles and seed corn maggots*
> - *Controls insects that spread viruses, like bean pod mottle and soybean mosaic viruses*

Since the harmonization discussions with Canada in 2003, US EPA has changed its mind about the interpretation of the phrase *"the sole purpose of the treatment is to protect the article or substance itself."* Using Byzantine logic in the Response to the Citizen Petition[106] filed in April 2017, US EPA attempts to justify the idea that a seed is equivalent to a plant. It appears likely that a judge will have to rule on the interpretation of this law to finally decide the matter.

The FIFRA exemption for "treated articles" only applies to pesticides "of a character not requiring FIFRA regulation."[107] The extensive number of studies conducted on neonicotinoid insecticides that demonstrate high acute and sublethal toxicity to bees and other beneficial insects,[108] widespread surface and ground water pollution and soil residuals,[109, 110, 111] and declines of insectivorous birds[112] correlated with neonicotinoid use indicate that these pesticides are most certainly of a character requiring FIFRA regulation. If treated seeds are to be sold, they must have an enforceable, FIFRA-compliant label.

8. State Lead Agencies concur that changes are necessary

States are at the front lines for regulation of pesticide use and label enforcement; however, if there is no label, there is no authority to conduct enforcement on the part of the state lead agency. As the SFIREG Treated Seed Issue Paper notes:[113] "*The EPA exemption of treated seeds from registration under the "Treated Article exemption" leaves the states with a regulatory gap related to environmental protection, disposal, enforcement, complaints, questions, and potential lawsuits."* From the beekeeper's point of view, beekeepers have nowhere to go to report losses and request investigation of the cause, as FIFRA does not apply. There is no accountability for a pesticide use that impairs a commercial beekeeper's ability to make a living.

A patchwork of regulatory guidelines exist across the 50 states, with some states having created stewardship guidelines for handling treated seeds,[114] and others doing nothing. The labeling on the seed bag tags is not always clear to the user, it is often not consistent from state to state, and it is unclear whether the State Lead Agencies have the authority to enforce the directives on a seed bag label.[113]

Some states have taken matters into their own hands, with New York passing the Birds and Bees Protection Act in December of 2023 prohibiting use of treated seed in New York after 2026.[115] In California, the State Assembly introduced A.B. 1042, which would require the CA Department of Pesticide Regulation to develop regulations for use of treated seeds.[116] While this bill was not signed by the Governor, the fact that both houses of the California Legislature passed this bill indicates consensus that the status quo must change. We are encouraged to see US EPA's response to SFIREG[117] and the response to the Citizen's Petition filed by the Pollinator Stewardship Council and others acknowledging some of these issues. Yet the US EPA seems intent on reducing "cost and complexity" in regulating treated seeds, noting:

> *The likely result* [of registering treated seeds as pesticide products] *would be: (1) a significant transition cost to farmers, during which availability of treated seed will be limited; (2) reduced flexibility to farmers to treat seed on the farm to tailor treatments to specific needs; (3) termination of tank mixing at commercial seed treatment facilities, which would eliminate the flexibility of tank mixing according to farmers' requests; and (4) increased costs to seed producers.*

We note here that it is not US EPA's job to make it easier and less costly for someone to disperse a poison into the environment. In fact, cost and complexity can serve as a deterrent to pollution, as evidenced by the results in Québec.[97] An easy solution is for farmers to plant untreated seed. There is a great deal of simplicity in that approach. And because there is little to no economic benefit to farmers from planting treated seed, and significant economic benefit from creating safe habitat for pollinators and beneficial insects in agricultural fields, there should be no question about the best way to proceed. US EPA has a mandate to protect the environment and not allow "unreasonable adverse effects." The failure to regulate treated seed is causing significant adverse effects on bees, beekeepers, farmers relying on pollination, and consumers who eat the food pollinated by bees.

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Sincerely yours,

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[28] 2020-23 policy changes/restrictions on neonicotinoid insecticides also referred to as "Extended Producer Responsibility Bills":

> **MN** (HF766, HF1317, HF2472) requiring additional seed label information; prohibiting certain seed uses; requiring product stewardship (including use, storage, disposal) for corn and soybean seed coated with neonicotinoids.
>
> **NE** (LB507, LB634) The Ethanol Development Act; in which the use of treated seed corn in the production of agricultural ethyl alcohol shall be prohibited if such use results in the generation of a byproduct that is deemed unsafe for livestock consumption or land application. And prohibiting to use of pesticide treated seeds in ethanol production.
>
> **NY** (S699B) enacts the birds and bees protection act; prohibits the sale of certain pesticides or use of seeds coated with such pesticides; requires the department of environmental conservation to review the latest scientific information concerning certain pesticide active ingredients.
>
> **CA** (AB567) on and after January 1, 2024, the use a of neonicotinoid on a seed is prohibited.
>
> **VT** (Act No. 35 (H.205) neonicotinoid pesticides approved for outdoor use as restricted use pesticides. Restricted use pesticides shall be sold by only a licensed dealer and shall only be applied by State certified applicators.
>
> **NJ** (A-2070) direct the Department of Environmental Protection to classify neonicotinoid pesticides as restricted use pesticides, and establish a list of chemicals that belong to the neonicotinoid class.

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