

39350 Minnesota Pollution Control Agency Request for Comments on Waste Treated Seeds Rule

Closed Oct 27, 2023 · Discussion · 3 Participants · 1 Topics · 3 Answers · 0 Replies · 2 Votes

3

PARTICIPANTS

1

TOPICS

3

ANSWERS

0

REPLIES

2

VOTES

SUMMARY OF TOPICS

SUBMIT A COMMENT

 3 Answers · 0 Replies


Important: All comments will be made available to the public. Please only submit information that you wish to make available publicly. The Office of Administrative Hearings does not edit or delete submissions that include personal information. We reserve the right to remove any comments we deem offensive, intimidating, belligerent, harassing, or bullying, or that contain any other inappropriate or aggressive behavior without prior notification.

Pat Miller · Citizen · (Postal Code: unknown) · Oct 27, 2023 10:56 am

 1 Votes

Please see the attached joint comment from CropLife America and the American Seed Trade Association

Matthew Berger · Citizen · (Postal Code: unknown) · Oct 27, 2023 1:46 pm

 1 Votes

Please see the attached public comments from Minnesota Corn Growers Association, Minn-Dak Farmers Cooperative, et al.

Rosemary Malfi · Citizen · (Postal Code: unknown) · Oct 27, 2023 2:14 pm

 0 Votes

Please see the attached joint comment from The Xerces Society for Invertebrate Conservation and American Bird Conservancy.



October 27, 2023

Mr. William Moore
Minnesota Office of Administrative Hearings
600 North Robert Street
St. Paul, MN 55164

Re: Comments on Planned New Rules Governing Waste Treated Seeds, Minnesota Rules, ch. 7035.3700 – 7035.3900; Revisor's ID Number R-04806

Dear Mr. Moore:

CropLife America (CLA) and the American Seed Trade Association (ASTA) appreciate the opportunity to comment on the Minnesota Pollution Control Agency's (MPCA) possible rulemaking on Minnesota Rules (Minn. R.) chapter 7035, relating to waste treated seeds. Any regulations promulgated by MPCA would impose impacts on each organization's members, who, as to CLA, develop and sell crop protection products for agriculture and pest management in the United States and, as to ASTA, develop, produce, and distribute seeds for use in agriculture in the United States and abroad.

With regard to regulatory jurisdiction over waste treated seed, the Minnesota Legislature has tasked MPCA, in consultation with the Department of Agriculture and University of Minnesota, with rulemaking to provide for the safe and lawful disposal of waste treated seed. The Legislature also directs that any new rules "must clearly identify the regulatory jurisdiction of state agencies ... with regard to such seed." In Minnesota, the Minnesota Department of Agriculture continues to have regulatory authority for all aspects of seed, seed treatments and treated seed¹. While MPCA undertakes this rulemaking on waste treated seed disposal given its regulatory jurisdiction over management and waste disposal of treated seed that will not be used by planting, we feel it is important for MPCA to exercise this authority in a manner that ensures consistency and uniformity with MDA's existing regulatory authority.

It is the view of both CropLife and ASTA that the MPCA treated seed disposal guidance document provides sufficient guidance to industry and to consumers regarding the proper use, limitations on use, and disposal of seed treated with pesticides². We believe the MPCA treated seed guidance, along with instructions on the seed bag tag, adequately address use, storage, handling, distribution, and disposal of treated seed to potentially avoid adverse impacts on

¹ Buying and Selling Seed in Minnesota, Minnesota Department of Agriculture, <https://www.mda.state.mn.us/plants-insects/buying-selling-seed-minnesota>

² Treated seeds, Minnesota Pollution Control Agency, <https://www.pca.state.mn.us/sites/default/files/w-hw4-51.pdf>

***Comments on Planned New Rules Governing Waste Treated Seeds,
Minnesota Rules, ch. 7035.3700 – 7035.3900; Revisor’s ID Number R-04806***

CropLife America & American Seed Trade Association

2

humans, food, livestock, fish, or wildlife and no unreasonable adverse effects on the environment. Indeed, the seed bag tag and label contain handling requirements, wildlife warnings, storage, disposal, and container handling instructions.

In summary, the use of seeds improved through modern technologies, such as seed treatments, continues to grow around the world because of their economic, environmental, and human health benefits. We encourage MPCA to avoid imposing new and unnecessary regulatory burdens on their use and disposal, given the current authority and regulatory resources that adequately enable their safe use. Thank you for your consideration of our comments on these possible regulations.

Sincerely,

Riley Titus
CropLife America
rtitus@croplifeamerica.org
(239) 398-0992

Pat Miller
American Seed Trade Association
pmiller@betterseed.org
(512) 259-2118

GISLASON & HUNTER LLP
ATTORNEYS AT LAW

Matthew C. Berger
Also admitted in Iowa
507-354-3111
mberger@gislason.com

October 27, 2023

Mr. William Moore
Office of Administrative Hearings
600 N Robert Street
P.O. Box 64620
St. Paul, MN 55164-0620

Re: Public Comments – Planned New Rules Governing Waste Treated Seeds

Dear Mr. Moore:

On July 6, 2023, the Minnesota Pollution Control Agency issued a Request for Comments with respect to a possible new administrative rule regulating the management and disposal of treated seeds that will not be used to plant agricultural crops. This rulemaking process is undertaken in response to a law enacted during the 2023 Legislative Session that requires “[t]he commissioner of the Pollution Control Agency, in consultation with the commissioner of agriculture and the University of Minnesota,” to adopt administrative rules “providing for the safe and lawful disposal of waste treated seed” and to “clearly identify the regulatory jurisdiction of state agencies and local governments with regard to such seed.” 2023 Minn. Laws ch. 60, art. 3, § 28. I am submitting the following comments regarding the MPCA’s proposed rulemaking on behalf of Minn-Dak Farmers Cooperative, Minnesota Corn Growers Association, Minnesota Crop Production Retailers, Minnesota Farm Bureau, Minnesota Soybean Growers Association, Minnesota Wheat Growers Association, Red River Valley Sugarbeet Growers, and Southern Minnesota Beet Sugar Cooperative.

GISLASON & HUNTER LLP

Page 2

Mr. William Moore
Office of Administrative Hearings
October 27, 2023

BACKGROUND

A “pesticide” is “a substance or mixture of substances intended to prevent, destroy, repel, or mitigate a pest, and a substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.” Minn. Stat. § 18B.01, subd. 18 (2022); *see* 7 U.S.C. § 136(u). At the federal level, pesticides are extensively regulated by the Environmental Protection Agency under the Federal Insecticide, Fungicide, Rodenticide Act (FIFRA), 7 U.S.C. § 136 *et seq.* FIFRA, and the regulations that implement it, generally prohibits the distribution or sale of any pesticide unless the pesticide is registered. *See* 7 U.S.C. § 136a(a). As part of the registration process, an applicant must provide “a complete copy of the labeling of the pesticide, a statement of all claims to be made for it, and any directions for its use.” 7 U.S.C. § 136a(c)(1). Before registering a pesticide, the EPA generally must determine that the pesticide “will perform its intended function without unreasonable adverse effects on the environment” based on the proposed use as described in the application materials (including the proposed label). *See* 7 U.S.C. § 136a(c)(5).

In Minnesota, pesticides are also highly regulated under existing laws and regulations. Under existing law, “[a] person may not use, store, handle, distribute, or dispose of a pesticide, rinsate, pesticide container, or pesticide application equipment in a manner: (1) that is inconsistent with a label or labeling as defined by FIFRA; (2) that endangers humans, damages agricultural products, food, livestock, fish, or wildlife; or (3) that will cause unreasonable adverse effects on the environment.” Minn. Stat. § 18B.07, subd. 2 (2022). Existing law specifically designates the Minnesota Department of Agriculture as “the lead state agency for the regulation of pesticides” and delegates authority to the Commissioner of Agriculture to “administer, implement, and enforce” the state laws governing pesticides. Minn. Stat. § 18B.03, subd. 1 (2022). Existing law also specifically directs the Commissioner of Agriculture to “adopt rules to implement and enforce” the state laws governing pesticides, including “rules to govern the distribution, use, storage, handling, and disposal of pesticides, rinsates, and pesticide containers.” Minn. Stat. § 18B.06, subds. 1, 3 (2022). Finally, during the 2023 Legislative Session, the Minnesota Legislature adopted a new law—to be codified with existing laws governing pesticides in Minnesota Statutes chapter 18B—providing that “[a] person may not use, store, handle, distribute, or dispose of seed treated with pesticide

GISLASON & HUNTER LLP

Page 3

Mr. William Moore
Office of Administrative Hearings
October 27, 2023

in a manner that: (1) endangers humans, food, livestock, fish, or wildlife; or (2) will cause unreasonable adverse effects on the environment.” 2023 Minn. Laws ch. 60, art. 9, § 2 (to be codified at Minn. Stat. § 18B.075).

COMMENTS

In describing the background for this rulemaking process, the Minnesota Pollution Control Agency states that “[w]hile the Minnesota Department of Agriculture (MDA) and the U.S. Environmental Protection Agency (EPA) regulate the pesticides and fungicides that are used to treat seeds, treated seeds themselves are exempt from those requirements.” MPCA, *Waste Treated Seeds*, <https://www.pca.state.mn.us/get-engaged/waste-treated-seeds> (last visited Oct. 18, 2023). This legal premise, however, is inaccurate and misleading.

Federal regulations enacted by the Environmental Protection Agency to implement FIFRA provide an exemption for treated articles and substances:

The pesticides or classes of pesticides listed in this section have been determined to be of a character not requiring regulation under FIFRA, and are therefore exempt from all provisions of FIFRA when intended for use, and used, only in the manner specified.

(a) Treated articles or substances. An article or substance treated with, or containing, a pesticide to protect the article or substance itself (for example, paint treated with a pesticide to protect the paint coating, or wood products treated to protect the wood against insect or fungus infestation), if the pesticide is registered for such use.

40 C.F.R. § 152.25 (2023). But as the EPA thoroughly explained in responding to a Citizen Petition that requested administrative action related to treated seeds, the treated-article exemption to FIFRA is conditioned on the pesticide that was used to treat the seed being “registered for such use.” See EPA, *Response to the April 2017 Petition from Center for Food Safety and Others Related to EPA Regulation of Pesticide-Treated Seed* (“EPA Response to Petition”), at 23, available at <https://www.regulations.gov/document/EPA-HQ-OPP-2018-0805-0104> (Sept. 27, 2022). In order for a treated article to satisfy

GISLASON & HUNTER LLP

Page 4

Mr. William Moore
Office of Administrative Hearings
October 27, 2023

this condition, “the presence of the pesticide in the article or substance [must] be the result of treatment using a pesticide registered for the use and requiring that the registered pesticide be expressly labeled for the precise use in question.” *Id.* at 24-25. And before registering a pesticide with a label that authorizes use to treat seeds, the EPA must complete a “thorough assessment of the treating pesticide product, including any exposure and risk to human and ecological health from use of the treating pesticide and use of the treated article,” to determine that the use of the pesticide in this manner “would protect ‘man and the environmental from unreasonable adverse effects.’ ” *Id.* at 23 (emphasis added). Further, the “registered for such use” condition also requires that the distribution, sale, and use of the treated seed be “be consistent with any instruction on the registered pesticide product labeling, as communicated on the seed bag tag labeling.” *Id.* at 39.

In other words, pesticide-treated seeds are not wholly exempt from the requirements of FIFRA or applicable state laws. Instead, the regulation of such treated seeds is necessarily part of, and subject to, the regulation of the pesticide that was used to treat the seed. Thus, the legal premise upon which the Minnesota Pollution Control Agency has commenced this rulemaking process is inaccurate—treated seeds, like other articles treated with pesticides, are already regulated as part of the existing federal and state laws that regulate the pesticides used to treat the seeds.

Separately from the existing regulations (under both FIFRA and state law) of pesticides that are distributed and used through treated seeds, the Minnesota Pollution Control Agency published a guidance document in April 2022 that provides recommended management practices for disposal of treated seeds that will not be used for planting. Each of the groups who join in submitting these comments support the MPCA’s informal guidance and encourage their members to implement the recommended practices described by the MPCA when disposing of excess treated seed that will not be used to plant a crop.

In light of the existing regulations and guidance, Minn-Dak Farmers Cooperative, Minnesota Corn Growers Association, Minnesota Crop Production Retailers, Minnesota Farm Bureau, Minnesota Soybean Growers Association, Minnesota Wheat Growers Association, Red River Valley Sugarbeet Growers, and Southern Minnesota Beet Sugar Cooperative do not believe that additional government

GISLASON & HUNTER LLP

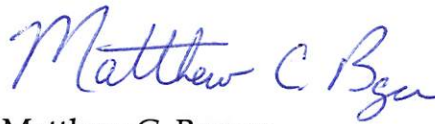
Page 5

Mr. William Moore
Office of Administrative Hearings
October 27, 2023

regulation is necessary or appropriate. Nonetheless, if the Minnesota Pollution Control Agency decides to move forward with the rulemaking process as described in the Request for Comments, these groups look forward to participating further in the process once specific rules are prepared and published for comment.

Thank you for your attention concerning this matter.

Very truly yours,



Matthew C. Berger

MCB:elm

cc: Kaitlyn Bemis, Minnesota Farm Bureau (*via e-mail only*)
Joe Smentek, Minnesota Soybean Growers Association (*via e-mail only*)
Lee Helgen, Minnesota Crop Production Retailers (*via e-mail only*)
Bruce Kleven, Minnesota Wheat Growers Association, Red River Valley
Sugarbeet Growers, and Minn-Dak Farmers Cooperative (*via e-mail only*)
Jeff Rustvang, Southern Minnesota Beet Sugar Cooperative (*via e-mail only*)
Amanda Bilek, Minnesota Corn Growers Association (*via e-mail only*)



Attn: Mr. William Moore
The Office of Administrative Hearings
600 Robert St N, St Paul, MN 55101

Subject: Public Comment on Planned New Rules Governing Waste Treated Seeds, Minnesota Rules, ch. 7035.3700 – 7035.3900; Revisor’s ID Number R-04806; OAH Docket No. 23-9003-39350

Oct 27, 2023

Dear Mr. Moore,

The Xerces Society for Invertebrate Conservation and American Bird Conservancy respectfully submit these comments on the planned new rules governing waste treated seeds in Minnesota. **The Xerces Society** is an international nonprofit that uses science-driven methods to protect invertebrate wildlife and their habitat. Our organization is recognized as a global leader in pollinator conservation by entities such as the U.N. Food and Agriculture Organization and USDA-NRCS, and we work directly with farmers across Minnesota to safeguard pollinator populations. **American Bird Conservancy** is an international non-profit that seeks to conserve birds and habitats across the Americas. ABC staff are trusted partners for the Minnesota Department of Natural Resources, Minnesota Department of Agriculture, US Fish and Wildlife Service, US Forest Service, and also work actively with Minnesota residents to advance bird conservation practices and issues.

Ensuring the judicious use and proper disposal of pesticide-treated seed is an important issue for the Xerces Society and American Bird Conservancy. We are glad that Minnesota is working to codify disposal regulations and we appreciate the opportunity to provide input during your rulemaking process. We offer our thoughts below.

1. **Pesticide-treated seeds entering the waste stream should be handled as hazardous waste.**

Pesticides are generally considered hazardous waste and we ask MPCA to consider handling pesticide-treated seed in the same manner. Presently, MPCA’s guidelines for waste pesticide-treated seed disposal state that waste treated seed and packaging are *“industrial solid waste with no need for further hazardous waste evaluation by the generator, landfill, or WTE incineration facility.”* Depending on the active ingredient, many pesticide-treated seed labels - such as those for products containing imidacloprid - indicate their danger to human health, wildlife, and waterways. Seeds treated with toxic substances should be subject to the same “cradle-to-grave” oversight that is applied to other hazardous materials.

Presently, the MPCA guidance document addresses the need for landfills accepting pesticide-treated seed to immediately cover the seed to protect wildlife, but it does not address the need to protect against the leaching of concentrated pesticides into soil and groundwater. Reclassification of pesticide-treated seeds as hazardous waste would help to ensure they are received by a facility equipped to contain leachate. Because MPCA oversees permitting and reporting for hazardous waste, reclassification would also allow Minnesota to track the amount of excess seed that is disposed of each year, a metric that is currently not well documented (see comment #2). At a minimum, regulations should require MPCA-approved Industrial Solid Waste Management Plans to include protections against leaching.

At the moment, the MPCA's guidance indicates that generators must communicate with waste management facilities to ensure they are able to receive pesticide-treated seed and their packaging. We encourage MPCA to explore the possibility of creating programs or requirements whereby end-users may send their waste pesticide-treated seed back to the entity that treated the seed (e.g., manufacturer), who is then responsible for proper disposal. We reiterate the need for the treated seed to go to disposal sites equipped to address leachate.

2. We encourage MPCA to track pesticide-treated seed entering the waste stream. Tracking treated seed use and disposal is important for understanding the state's capacity to properly handle and dispose of treated seed waste.

It is estimated that nearly all U.S. corn and the majority of soybeans are grown from insecticide-treated seed (Douglas & Tooker 2015), which are among Minnesota's top commodity exports. Pesticides are also used as seed treatments on many other commodity and specialty crops. For example, the neonicotinoid imidacloprid is approved for use as a seed treatment on alfalfa, wheat, canola, sorghum, sunflower, squash, and more. (See the [Xerces Systemic Insecticide Database](#) for more information on which systemics are approved for various crops.)

To the best of our understanding, MPCA does not collect or report information on the amount of treated seed received by solid waste facilities. It is also the case that data on annual treated seed use in agricultural production is not collected or reported by MDA. Gathering information on sales, use, and disposal would aid MPCA and other agencies in accurately estimating and anticipating how much treated seed is or will be making its way to landfills or WTE facilities. In turn, this will allow the state to ensure it has the resources and means to handle this waste stream over time. It might also allow treated seed manufacturers and distributors to calibrate treated seed production to prevent excess waste.

We also note that enforcement of disposal rules will be a difficult task without new record-keeping requirements. If sellers and end users were required to keep records of treated seed purchases and use and if waste facilities were required to keep records of disposals, it would be possible for regulators to identify and investigate discrepancies. We encourage MPCA to gather as much information on the use of pesticide-treated seed as its authority allows.



3. We encourage MPCA to create regulations regarding the use of excess treated seed for wildlife plantings as part of its rulemaking process.

The MPCA guidance document states that pesticide-treated seeds, depending on label directions, may be permitted for wildlife habitat. We encourage MPCA to create regulations that clearly prohibit the use of insecticide-treated seed for this purpose, especially on refuge lands and state-managed wildlife lands (state parks, wildlife management areas, etc.).

Though habitat is being created with conservation in mind, sowing insecticide-treated seeds carries risks for wildlife. The widespread, prophylactic use of neonicotinoid treated seeds on various crops, including corn, soy, wheat, and even alfalfa - a pollinator-attractive plant - is causing harm to pollinator populations (Hopwood et al. 2018), birds (Mineau & Kern 2023), and mid-western waterways (The Xerces Society, 2021). Seed treatments can also disrupt soil communities (Parizadeh et al. 2021). Recent research found high levels of neonicotinoids in wild white-tailed deer in North Dakota and linked neonicotinoid levels in the spleens of deer to deformities and reduced health (Berheim et al. 2019). Neonicotinoids are also being found in pheasants, possibly owing to contaminated forage (Daley 2019), which can have harmful effects at high levels (Sundall 2020). Observational studies on Minnesota farmland have found that growers are not properly mitigating spilled neonicotinoid-coated seed during the course of planting, directly exposing local wildlife to toxic chemicals and underscoring the need for regulations on use of excess treated seed for wildlife plantings (Roy et al. 2019).

Excess treated seed is often sold at discounted rates for spring food lots - a form of wildlife habitat that is usually planted to support game species. Food lots with plants grown from insecticide-treated seeds are a risk to the very animals they are intended to sustain. The high water solubility of treatment active ingredients makes them liable to contaminate local waterways, leading to non-target invertebrate impacts and, ultimately, aquatic habitats and ecosystems with lower productivity (Hallmann 2014, Hladik et al. 2018). New rules that specifically prohibit insecticide-treated seed for on-farm habitat would provide clarity on this issue for end users.

4. We appreciate the current guidelines that prohibit ethanol production and burial as methods of waste treated seed disposal, even if the label instructs otherwise, and support inclusion of these restrictions in the final rules.

In early 2021, severe pesticide contamination was uncovered at an ethanol plant outside of Mead, Nebraska. Nearby bee-kills led to the discovery that the plant was accepting the vast majority of excess treated corn seed in North America and processing it into ethanol – resulting in byproducts with astronomical levels of pesticide contamination. These byproducts were then spread on local fields as soil conditioners or via irrigation, and contaminated the surrounding area and its waterways with pesticides. Cleaning up the contaminated plant is expensive and challenging, and it will continue to pose risks to the area for some time. The situation in Mead raises critical questions about how treated seed should be handled in order to avoid contamination, and we thank MPCA for its firm language prohibiting the use of waste treated seed for ethanol, biodiesel, or other fermentation or oil processing.



Burial of excess seed is also a concern because this can further contribute to surface and groundwater contamination. Neonicotinoids, which are applied as seed treatments to some of Minnesota's most abundant crops (corn, soy, wheat) are water soluble, and thus often end up in waterways. Most of the neonicotinoids applied to seeds are not absorbed by the growing plants, leaving 80–98% of the pesticides in the soil, where they can then move into surface or groundwater (Alford & Krupke 2017). As a result, neonicotinoids are present in Midwestern waterways throughout the year, often at levels that pose risk to aquatic species (Hladik et al. 2018, Schepker et al. 2020). Broader studies across the Midwest have also noted elevated pulses of neonics in waterways during crop planting, attributed to seed treatments (Hladik et al. 2014, Berens et al. 2021). We thank MPCA for prohibiting the burial of waste pesticide-treated seeds, which would otherwise be a needless source of environmental contamination.

5. We ask for greater clarity regarding the burial prohibition exemption granted to farmers who may “bury treated seeds from their own farm on the farm property.”

We would appreciate clarification on the exact meaning of this statement. Does this exemption allow farmers to bury any treated seed that is planted on the farm property? Or is the exemption specific to seed that was treated by the end user on-farm (as opposed to seed that was treated by the supplier)? For all the reasons noted above, we encourage MPCA to work with the farming community to prevent burial of pesticide-treated seeds and to instead send them to properly equipped disposal facilities that will contain or incinerate them. Burial of excess seed introduces unnecessary risks to the environment, including soil and water contamination and ingestion by wildlife. We reiterate that manufacturers could play a role in lessening the burden of excess seed on farmers by accepting the seed and handling its proper disposal.

We thank MPCA for the work they are doing to ensure the proper disposal of pesticide-treated seed and hope our comments will be given full consideration. We look forward to seeing the proposed Waste Treated Seed Rules when they are released.

Sincerely,



Rosemary Malfi, Ph.D.
Pesticide Program Specialist, Policy Lead
The Xerces Society for Invertebrate Conservation
rosemary.malfi@xerces.org



E. Hardy Kern III
Director of Government Relations, Pesticides and Birds Campaign
American Bird Conservancy
EHardyKern@abcbirds.org



References:

Alford & Krupke 2017. Translocation of the neonicotinoid seed treatment clothianidin in maize. PLoS One, 12(3):e0173836. doi: 10.1371/journal.pone.0173836.

Berens, M., P. Capel, and W. Arnold. 2021. Neonicotinoid insecticides in surface water, groundwater, and wastewater across land-use gradients and potential effects. Environmental Chemistry 40(4):1017–1033.

Daley, J. 2019, April 30. As pesticides turn up in more places, safety concerns mount. Scientific American: Environment. [Link to article.](#)

Douglas & Tooker. 2015. Large scale deployment of seed treatments has driven rapid increase in use of neonicotinoids and preemptive pest management in U.S. field crops. Environmental Science and Technology 49(8), 5088–5097. doi: 10.1021/es506141g

Hallmann et al. 2014. Declines in insectivorous birds are associated with high neonicotinoid concentrations. Nature 511:341-343. <https://doi.org/10.1038/nature13531>

Hladik et al. 2018. Year-round presence of neonicotinoid insecticides in tributaries to the Great Lakes, USA. Environmental Pollution 235:1022–1029, doi: 10.1016/j.envpol.2018.01.013

Hopwood et al. 2018. How Neonicotinoids Can Kill Bees: The Science Behind the Role These Insecticides Play in Harming Bees. 2nd Edition [Report]. The Xerces Society. [Link to report.](#)

Mineau & Kern. 2023. Neonicotinoid insecticides: Failing to come to grips with a predictable environmental disaster [Report]. American Bird Conservancy. [Link to report.](#)

Parizedah et al. 2021. Neonicotinoid seed treatments have significant non-target effects on phyllosphere and soil bacterial communities. Frontiers in Microbiology: Terrestrial Microbiology, 11, doi: 10.3389/fmicb.2020.619827

Schepker et al.. 2020. Neonicotinoid insecticide concentrations in agricultural wetlands and associations with aquatic invertebrate communities. Agriculture, Ecosystems & Environment 287:106678, doi: 10.1016/j.agee.2019.106678

Sundall, M. 2020. The Effect of Neonicotinoid Clothianidin on Ring-Necked Pheasant Survival and Reproduction. Electronic Theses and Dissertations. 4065. URL: <https://openprairie.sdstate.edu/etd/4065>

The Xerces Society for Invertebrate Conservation. 2021. Protecting aquatic ecosystems: Insecticide seed treatments threaten midwestern waterways [Fact Sheet]. [Link to fact sheet.](#)

