

April 17, 2025

Submitted via email to cda_rulemaking@state.co.us

Commissioner Kate Greenberg
Colorado Department of Agriculture
305 Interlocken Parkway
Broomfield, CO 80021

Re: Written Comments on [Agricultural Stewardship Tax Credit](#) – Qualified Stewardship Practice Should Address Neonicotinoid Pollution from Coated Seeds

The undersigned environmental, health, and consumer organizations appreciate the opportunity to comment on the Colorado Department of Agriculture’s (CDA) draft rules pertaining to the Agricultural Stewardship Tax Credit.

CDA’s swift efforts to put HB24-1249 into action will provide a crucial funding stream for Colorado farmers and reward leaders in environmental stewardship. However, the draft rule leaves a concerning gap: it does not recognize reductions in use of neonicotinoids – one of the most ecologically harmful classes of insecticides – as a Qualified Stewardship Practice. Farmers and ecosystems alike will benefit from reducing the widespread use of these chemicals, particularly as seed treatments. We urge CDA to add **Use of Seed Without Neonicotinoid Coatings** as a Qualified Stewardship Practice in the final rule.

I. Use of Neonicotinoid Seed Coatings in Field Crops Contaminates the Environment.

Neonicotinoids are the most widely used insecticides in the world.¹ Their use as coatings on field crop seeds, including corn and wheat, represent the vast majority of neonicotinoid use in the United States.² It is estimated that almost all conventional corn seeds and between 20-44% of wheat seeds in the United States are coated with a

¹ See Thomas C. Sparks, *Insecticide Discovery: An Evaluation and Analysis*, 107, 1 Pesticide Biochemistry and Physiology 8-17 (Sept. 2013), <http://dx.doi.org/10.1016/j.pestbp.2013.05.012>.

² AgInfomatics, *The Value of Neonicotinoids in North American Agriculture: Estimated Impact of Neonicotinoid Insecticides on Pest Management Practices and Costs for U.S. Corn, Soybean, Wheat, Cotton and Sorghum Farmers* (2014) (“Seed treatments are the primary method of application of neonicotinoid insecticides for [U.S. corn, soybean, wheat, cotton, and sorghum] crops, accounting for more than 98 percent of the 133 million base acres treated.”), <https://growingmatters.org/wp-content/uploads/2017/04/report-aginfomatics-estimated-impact-of-neonicotinoids-in-ag-2014.pdf>.

neonicotinoid before planting³ – covering upwards of 2 million acres in Colorado every year.⁴

Target plants typically take up less than 5% of neonicotinoid seed coatings, and the other 95% can persist and move through soil, water, and air for years.⁵ In addition, given their high water-solubility, rain and irrigation water carry neonicotinoids long distances, spreading the chemicals well beyond the application site.⁶ As a result, wild plants⁷ and waterways⁸ frequently become contaminated with neonicotinoids. For instance, in a 2015 study, at least one neonicotinoid was detected in 63% of the 48 streams sampled nationwide.⁹ Colorado’s Agricultural Water Quality Program Database includes well water samples that reveal neonicotinoid contamination in the state’s groundwater.¹⁰

Use of neonicotinoid seed coatings tends to be the default in field crops, and farmers must take proactive steps to avoid intentionally or even inadvertently applying these harmful chemicals prophylactically when they plant their crops.¹¹

³ See Margaret R. Douglas et al., *Large-Scale Deployment of Seed Treatments Has Driven Rapid Increase in Use of Neonicotinoid Insecticides and Preemptive Pest Management in U.S. Field Crops* (2015), <https://pubs.acs.org/doi/10.1021/es506141g>; Claudia Hitaj et al., *Sowing Uncertainty: What We Do and Don’t Know about the Planting of Pesticide-Treated Seed* 70, 5 *BioScience* 390–403 (May 2020), <https://doi.org/10.1093/biosci/biaa019>; U.S. Environmental Protection Agency, *Benefits and Impacts of Potential Mitigation for Neonicotinoid Seed Treatments on Small Grains, Vegetable, and Sugarbeet Crops* (2018), <https://www.regulations.gov/document/EPA-HQ-OPP-2008-0844-1622>.

⁴ See U.S. Department of Agriculture, *Annual Crop Summary 2024 – Colorado Highlights*, https://data.nass.usda.gov/Statistics_by_State/Colorado/Publications/News_Releases/2025/CO-Crop-Production-01102025.pdf#:~:text=Winter%20wheat%20production%20in%20Colorado%2C%20estimated%20at,harvested%20for%20grain%2C%20estimated%20at%201.84%20million (corn planted area totaled 1.46 million acres; wheat producers seeded 2.10 million acres).

⁵ Dave Goulson, “Pesticides Linked to Bird Declines,” 511 *Nature* 295-296 (July 2014), <https://go.nature.com/2rNOZcK>; see also EPA, *Pesticide Fact Sheet for Clothianidin*, 15 (2003), https://www3.epa.gov/pesticides/chem_search/reg_actions/registration/fs_PC-044309_30-May-03.pdf.

⁶ See Thomas J. Wood & Dave Goulson, *The Environmental Risks of Neonicotinoid Pesticides: a Review of the Evidence Post 2013*, 24, 21 *Environ Sci Pollut Res Int* 17285-17325 (Jun. 7, 2017), <https://doi.org/10.1007/s11356-017-9240-x>.

⁷ See Christian H. Krupke et al., *Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields*, 7, 1 *PLoS One* e29268 (Jan. 3, 2012), <https://doi.org/10.1371/journal.pone.0029268> (finding neonicotinoid contamination in nontarget flowers, stating that contamination came from deposition on the flowers, uptake by the root system, or both).

⁸ See Michelle L. Hladik & Dana W. Kolpin, *First National-Scale Reconnaissance of Neonicotinoid Insecticides in Streams Across the USA*, 13, 1 *Env’t Chem* 12-20 (Aug. 18, 2015), <https://doi.org/10.1071/EN15061>; Michelle L. Hladik et al., *Year-Round Presence of Neonicotinoid Insecticides in Tributaries to the Great Lakes*, 235 *Environmental Pollution* 1022-1029 (Apr. 1, 2018), <https://doi.org/10.1016/j.envpol.2018.01.013>.

⁹ Hladik & Kolpin, *First National-Scale Reconnaissance of Neonicotinoid Insecticides in Streams*.

¹⁰ Agricultural Water Quality Program Database, <https://awqp.erams.com/docs?token=OWLfkKgQPz>.

¹¹ Hitaj et al., *Sowing Uncertainty: What We Do and Don’t Know*.

II. Use of Seed Without Neonicotinoid Coatings Meets the Definition of a Qualified Stewardship Practice.

HB24-1249 defined “Qualified Stewardship Practice” as any agricultural practice that “improves soil health ... or creates more diverse and beneficial ecosystems while maintaining the productivity of the farm.” Colorado Revised Statutes § 39-22-561(2)(b). Neonicotinoid seed coatings are harmful to soil health and ecosystems, and they do not provide meaningful productivity benefits to farmers. Accordingly, Use of Seed Without Neonicotinoid Coatings can and should be recognized as a Qualified Stewardship Practice eligible for a tax credit.

A. Reducing Neonicotinoid Use Supports More Diverse and Beneficial Ecosystems.

The widespread use of neonicotinoids and resulting environmental contamination poses a serious threat to ecosystems because neonicotinoids are directly and indirectly toxic to many species.¹² One neonicotinoid-coated corn seed contains enough active ingredient to kill a quarter million bees¹³ or a small songbird.¹⁴ Neonicotinoids kill insects by permanently binding to, overstimulating, and ultimately destroying nerve cells.¹⁵ Even at sublethal doses, neonicotinoids can weaken bees’ immunity¹⁶ and critical functions like flight endurance.¹⁷ Similarly, neonicotinoids have been shown to impact neurological and developmental functions in animals throughout ecosystems, from birds to deer – as well as humans.¹⁸ The widespread harm to terrestrial invertebrates¹⁹ and aquatic

¹² See Lennard Pisa et al., *An Update of The Worldwide Integrated Assessment (WIA) On Systemic Insecticides. Part 2: Impacts On Organisms and Ecosystems* (2017), <https://link.springer.com/article/10.1007/s11356-017-0341-3>.

¹³ See Daniel Raichel & Jennifer Sass, *Bigger Than Bees: How Neonics Contaminate Water, Threaten Ecosystems, and Cause Human Health Concerns in New York*, NRDC (2020), <https://www.nrdc.org/sites/default/files/bigger-than-bees-neonics-new-york-report.pdf>.

¹⁴ Ana Lopez-Antia et al., *Imidacloprid-Treated Seed Ingestion Has Lethal Effect on Adult Partridges and Reduces Both Breeding Investment and Offspring Immunity*, 136 *Environmental Research* 97-107 (Jan. 2015), <https://doi.org/10.1016/j.envres.2014.10.023>.

¹⁵ See J.A. Gervais et al., *Imidacloprid Technical Fact Sheet*, National Pesticide Information Center, Oregon State University Extension Services (2010), <http://npic.orst.edu/factsheets/archive/imidacloprid.html>.

¹⁶ Gennaro Di Prisco et al., *Neonicotinoid Clothianidin Adversely Affects Insect Immunity and Promotes Replication of a Viral Pathogen in Honey Bees*, 110, 46 *Proc Natl Acad Sci USA* 8466-8471 (Nov. 12, 2013), <https://doi.org/10.1073/pnas.1314923110>.

¹⁷ Daniel Kenna et al., *Pesticide Exposure Affects Flight Dynamics and Reduces Flight Endurance in Bumblebees*, 9, 10 *Ecology and Evolution* 5637-5650 (May 2019), <https://doi.org/10.1002/ece3.5143>.

¹⁸ See, e.g., Jennifer Sass, *Two New Papers Reveal Startling Human Health Risks from Neonicotinoid Pesticides*, NRDC (Jan. 27, 2025), <https://www.nrdc.org/bio/jennifer-sass/two-new-papers-reveal-startling-human-health-risks-neonicotinoid-pesticides>.

¹⁹ See, e.g., L. W. Pisa, *Effects of Neonicotinoids and Fipronil on Non-Target Invertebrates*, 22 *Environmental Science and Pollution Research* 68-102 (Sept. 17, 2014), <https://doi.org/10.1007/s11356-014-3471-x> (“Neonicotinoid insecticides exhibit very high toxicity to a wide range of invertebrates, particularly insects.”).

invertebrates²⁰ from neonicotinoids also has indirect impacts on many vertebrate species that rely on invertebrates as a food source, such as birds²¹ and fish.²²

Insecticides, and particularly neonicotinoids, play a major role in the ongoing decline of insect populations worldwide. A global review published in 2019 found that over 40% of insect species are declining, with pesticides among the primary drivers of these losses.²³ Colorado's recent native pollinating insects study reinforced this finding, naming pesticides as a significant driver of declines in the state's native pollinating insect populations.²⁴ Increases in neonicotinoid and pyrethroid insecticide use have been documented as driving harm to wild bee populations, with some declining as much as 50% from 1998 to 2015.²⁵ Neonicotinoids – and especially “the initial deployment and rapid adoption of seed-treated neonicotinoids in corn and soybean plantings” – have also been identified as “the most significant environmental driver” of monarch butterfly losses in the Midwest.²⁶ Likewise, long-term exposure to imidacloprid at extremely small amounts – 10 parts per trillion or “10 grains of sand in an Olympic-size swimming pool”²⁷ – is enough to harm aquatic insects and other invertebrate species.²⁸

Bird health is directly threatened by ingestion of neonicotinoid coated seeds in three situations: mechanized planting leaves large numbers of seeds on the soil surface for birds to scavenge; seed spills leave piles of seeds for birds to consume in significant quantities; and birds dig up seeds and young sprouts.²⁹ One recent meta-analysis found

²⁰ See, e.g., Tessa C. Van Dijk, Marja A. Van Staalduinen, & Jeroen P. Van der Sluijs, *Macro-Invertebrate Decline in Surface Water Polluted With Imidacloprid*, 8, 5 PLoS One e62374 (2013), <https://doi.org/10.1371/journal.pone.0062374> (finding “a significant negative relationship ($P < 0.001$) between macro-invertebrate abundance and imidacloprid concentration for all species pooled” in surface water).

²¹ See Yijia Li, Ruiqing Miao, & Madhu Khanna, *Neonicotinoids and Decline in Bird Biodiversity in the United States*, 3 Nature Sustainability 1027-1035 (2020), <https://doi.org/10.1038/s41893-020-0582-x> (showing that increased neonicotinoid use in the United States “led to statistically significant reductions in bird biodiversity between 2008 and 2014”).

²² David Gibbons, Christy Morrissey, & Pierre Mineau, *A Review of the Direct and Indirect Effects of Neonicotinoids and Fipronil on Vertebrate Wildlife*, 22, 1 Environ Sci Pollut Res Int. 103-118 (Jun. 18, 2014), <https://doi.org/10.1007/s11356-014-3180-5> (explaining how imidacloprid uses reduced invertebrate prey and impaired growth of fish).

²³ Francisco Sánchez-Bayo & Kris A.G. Wyckhuys, *Worldwide Decline of the Entomofauna: A Review of its Drivers*, 232 Biological Conservation 8–27 (Apr. 2019), <https://doi.org/10.1016/j.biocon.2019.01.020>.

²⁴ Steve Armstead et al., *Colorado Native Pollinating Insects Health Study* (Jan. 2024), available at https://drive.google.com/file/d/1HByF7H2qQ4vf_0GhKEG2eNiArs9GlwrP/view.

²⁵ Laura M. Guzman et al., *Impact of Pesticide Use on Wild Bee Distributions Across the United States*, 7 Nature Sustainability 1324-1334 (Aug. 27, 2024), <https://doi.org/10.1038/s41893-024-01413-8>.

²⁶ Braeden Van Deynze et al., *Insecticides, More Than Herbicides, Land Use, and Climate, Are Associated With Declines in Butterfly Species Richness and Abundance in the American Midwest*, 19, 6 PLoS One e0304319 (June 20, 2024), <https://doi.org/10.1371/journal.pone.0304319>.

²⁷ Raichel & Sass, *Bigger Than Bees*.

²⁸ U.S. Environmental Protection Agency, *Aquatic Life Benchmarks and Ecological Risk Assessments for Registered Pesticides*, Imidacloprid, https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk#ref_4.

²⁹ See Memorandum from U.S. Department of the Interior on Guidelines Regarding the Interim Use and Phase Out of Neonicotinoid Insecticides to Grow Agricultural Crops for Wildlife on NWRs in the Pacific Region 8–9 (Jul. 9, 2014), <https://ecos.fws.gov/ServCat/DownloadFile/60628?Reference=59056> (“The U.S. EPA estimates that ~0.5-1% of drilled seed remains accessible to wildlife on the soil surface.”).

that neonicotinoids impact all aspects of bird life, including bird health, behavior, reproduction, and survival.³⁰ Another study found that, on average, birds located seed spills within a day and a half after the spill and consumed all of the spilled seed within four days.³¹ That study also found neonicotinoid-treated seeds on the surface of 35% of the 71 studied fields.³² Even when treated seeds are completely covered with soil, birds and mammals still regularly consume emerging seeds by digging and scraping in the soil.³³ These exposure routes pose a substantial threat to birds: reports from Europe and North America confirm numerous bird deaths from feeding on neonicotinoid-coated seeds.³⁴ Even at sublethal levels, neonicotinoids can accumulate in the liver and harm both adult birds and chicks' immune systems.³⁵ Low-level neonicotinoid exposure can also delay migration and decrease reproductive success.³⁶

Mammals may also suffer health impacts from consuming neonicotinoids, including via neonicotinoid-polluted water, coated seeds and plants that have taken up neonicotinoids, and insects and other animals that have absorbed neonicotinoids.³⁷ For insect-eating mammals, depletion of insect prey from neonicotinoid deaths also indirectly threatens health.³⁸ One recent study found a relationship between neonicotinoid exposure and birth defects in white tailed deer, noting that imidacloprid

³⁰ Elke Molenaar et al., *Neonicotinoids Impact All Aspects of Bird Life: A Meta-Analysis*, 27,10 Ecology Letters e14534 (Oct. 2024), <https://doi.org/10.1111/ele.14534>.

³¹ Charlotte L. Roy et al., *Multi-Scale Availability of Neonicotinoid-Treated Seed for Wildlife in an Agricultural Landscape During Spring Planting*, 682 Science of The Total Environment 271-281 (Sept. 10, 2019), <https://doi.org/10.1016/j.scitotenv.2019.05.010>.

³² Roy et al., *Multi-Scale Availability of Neonicotinoid-Treated Seed for Wildlife in an Agricultural Landscape During Spring Planting*.

³³ See Memorandum from U.S. Department of the Interior on Guidelines Regarding the Interim Use and Phase Out of Neonicotinoid Insecticides to Grow Agricultural Crops for Wildlife on NWRs in the Pacific Region at 8 ("It is important to note that many species have the ability to scrape and dig for planted seed.").

³⁴ See, e.g., Floria Millot et al., *Field Evidence of Bird Poisonings by Imidacloprid-Treated Seeds: A Review of Incidents Reported by the French SAGIR Network From 1995 to 2014*, 24 Environ Sci Pollut Res 5469-5485 (Feb. 2017), <https://doi.org/10.1007/s11356-016-8272-y> (predicting the majority of the 734 bird deaths from imidacloprid poisoning were from treated seeds); Pierre Mineau, *Neonicotinoid Insecticides: Failing to Come to Grips With a Predictable Environmental Disaster*, 35 (June 2023), <https://abcbirds.org/wp-content/uploads/2023/07/2023-Neonic-Report.pdf> (discussing incident affecting hundreds of birds that ingested imidacloprid-treated wheat seeds).

³⁵ Lopez-Anita et al., *Imidacloprid-Treated Seed Ingestion has Lethal Effect on Adult Partridges*.

³⁶ Margaret L. Eng et al., *A Neonicotinoid Insecticide Reduces Fueling and Delays Migration in Songbirds*, 1117 Sci. (Sept. 13, 2019), <https://www.science.org/doi/10.1126/science.aaw9419>; Margaret L. Eng, et al., *Imidacloprid and Chlorpyrifos Insecticides Impair Migratory Ability in a Seed-Eating Songbird*, 7 (2017), https://www.researchgate.net/publication/320959198_Imidacloprid_and_chlorpyrifos_insecticides_impair_migratory_ability_in_a_seed-eating_songbird.

³⁷ See, e.g., Elise H. Berheim et al., *Effects of Neonicotinoid Insecticides on Physiology and Reproductive Characteristics of Captive Female and Fawn White-tailed Deer*, 9 Scientific Reports 4534 (Mar. 14, 2019), <https://www.nature.com/articles/s41598-019-40994-9> (identifying relationship between neonicotinoid exposure and birth defects in white tailed deer); Pierre Mineau & Carolyn Callaghan, *Neonicotinoid Insecticides and Bats – An Assessment of the Direct and Indirect Risks*, 14 (2018), https://cwf-fcf.org/en/resources/research-papers/1809-014-Bats-and-Neonics-Report-high_rez.pdf.

³⁸ Mineau & Callaghan, *Neonicotinoid Insecticides and Bats – An Assessment of the Direct and Indirect Risks* at 7.

was even present in the organs of the study's control group.³⁹ That same study also found that as neonicotinoid exposures increased, fawn survival, organ weight, jawbone length, and body weight decreased.⁴⁰ Another study found neonicotinoids in 61% of deer, with 29% above levels associated with birth defects and higher rates of death for fawns.⁴¹ Just two years later, a follow-up study showed neonicotinoid exposures dramatically increased, with neonicotinoids in 94% of deer and 64% at levels associated with higher rate of birth defects and death.⁴²

On the whole, neonicotinoids' extensive use as seed coatings, combined with their potent toxicity⁴³ and strong predisposition to contaminate soil and water,⁴⁴ make them an exceptional threat to ecosystems and biodiversity.⁴⁵ Farmers who opt out of using seed coated with neonicotinoids support more diverse and beneficial ecosystems in Colorado – on the farm and beyond.

B. Reducing Neonicotinoid Use Supports Soil Health.

As explained above, neonicotinoid seed coatings contaminate soil because most of the seed coating is not absorbed by the target plant. Neonicotinoids may enter soil directly from coated seeds, as well as from dust created during planting and via irrigation and rainwater that washes residual neonicotinoids through soil,⁴⁶ leading to build up in soil

³⁹ Berheim et al., *Effects of Neonicotinoid Insecticides on Physiology and Reproductive Characteristics of Captive Female and Fawn White-tailed Deer* at 5.

⁴⁰ Berheim et al., *Effects of Neonicotinoid Insecticides on Physiology and Reproductive Characteristics of Captive Female and Fawn White-tailed Deer* at 5.

⁴¹ Michelle Carstensen et al., *Assessing Neonicotinoid Exposure in Free-ranging Whitetailed Deer in Minnesota*, available at [https://assets.senate.mn/committees/2023-2024/3130 Committee on Environment Climate and Legacy/DNR DeerChickensAndNeonics Senate Hearing 14March2023 Final.pdf](https://assets.senate.mn/committees/2023-2024/3130%20Committee%20on%20Environment%20Climate%20and%20Legacy/DNR%20DeerChickensAndNeonics%20Senate%20Hearing%2014March2023%20Final.pdf).

⁴² Michelle Carstensen et al., *Assessing Neonicotinoid Exposure in Free-ranging Whitetailed Deer in Minnesota* at 6.

⁴³ See Jean-Marc Bonmatin et al., *An Update of the Worldwide Integrated Assessment (WIA) on Systemic Insecticides*, 28 *Environ Sci Pollut Res* 11709-11715 (Feb. 23, 2021), <https://doi.org/10.1007/s11356-021-12853-6>.

⁴⁴ See Michelle Hladik et al., *Widespread Occurrence of Neonicotinoid Insecticides in Streams in a High Corn and Soybean Producing Region*, 193 *Environmental Pollution* 189-196 (Oct. 2014), <https://doi.org/10.1016/j.envpol.2014.06.033> (showing clothianidin has been detected in Iowa streams at levels up to 0.257 ug/l).

⁴⁵ See, e.g., Van Deynze et al., *Neonicotinoids, More Than Herbicides, Land Use, and Climate, Drive Recent Butterfly Declines in the American Midwest* (finding "community-wide declines in total butterfly abundance and species richness to be most strongly associated with pesticides in general, and for butterflies species richness the use of neonicotinoid-treated seeds"); Kenneth V. Rosenberg, et al., *Decline of the North American Avifauna* (2019) (noting a net loss of approximately 3 billion birds in North America over 48 years), https://dariuszdziebko.wordpress.com/wp-content/uploads/2019/10/Bird-Diversion-paper_Science-formatted_final.pdf.

⁴⁶ Christian H. Krupke et al., *Multiple Routes Of Pesticide Exposure For Honey Bees Living Near Agricultural Fields*, 7, 1 *PLoS One* e29268 (Jan. 3, 2012), <https://doi.org/10.1371/journal.pone.0029268>; Christian H. Krupke et al., *Planting of Neonicotinoid-Treated Maize Poses Risks For Honey Bees and Other Non-Target Organisms Over a Wide Area Without Consistent Crop Yield Benefit*, 54, 5 *J. of Applied Ecology* 1449-1458 (May 22, 2017), <https://doi.org/10.1111/1365-2664.12924>; Arthur W. Schaafsma et al., *Fugitive Dust During Planting of Canola with Air Seeder a Source of Environmental Contamination for*

over time.⁴⁷ Concentrations of neonicotinoid residues in wind-erodible surface soil dust increase sharply after the planting of treated seeds. In one study, clothianidin and thiamethoxam concentrations in surface dust ranged from 6.71 to 808.75 ng/g over two years at nine farms.⁴⁸

Neonicotinoid contamination in soil has negative impacts on soil biodiversity and the health of the soil food web. These negative impacts are particularly pronounced on soil invertebrates, especially soil predators⁴⁹ – this includes insects,⁵⁰ nematodes⁵¹ and protists⁵² – higher up in the food web, as well as decomposers such as springtails⁵³ and earthworms.⁵⁴ By attacking a key mechanism that keeps pest populations under control – predators – neonicotinoids may reduce healthy soil's ability to suppress pest and disease populations naturally in the long term, increasing the need for pesticide applications over time. Organisms lower on the food chain can also be affected.⁵⁵ After neonicotinoid application, scientists have observed declines in potentially beneficial soil

Pesticides Applied on Seed - A Case Study, 39, 12 *Env't Tox. & Chem.* 2420-2423 (Oct. 5, 2020), <https://doi.org/10.1002/etc.4892>; Andrea Tapparo et al., *Assessment of the Environmental Exposure of Honeybees to Particulate Matter Containing Neonicotinoid Insecticides Coming From Corn Coated Seeds*, 46, 5 *Env't Sci. & Tech.* 2592–2599 (Jan. 31, 2012), <https://doi.org/10.1021/es2035152>.

⁴⁷ See Francisco Sánchez-Bayo & Henk A. Tennekes, *Time-Cumulative Toxicity of Neonicotinoids: Experimental Evidence and Implications for Environmental Risk Assessments*, 17, 5 *Intl. J. Env't Rsch. & Pub. Health* 1629 (Mar. 3, 2020), <https://doi.org/10.3390/ijerph17051629>.

⁴⁸ Victor Limay-Rios et al., *Neonicotinoid Insecticide Residues in Soil Dust And Associated Parent Soil in Fields With a History of Seed Treatment Use On Crops in Southwestern Ontario*, 35, 2 *Env't Tox. & Chem.* 303-310 (Sept. 23, 2015), <https://doi.org/10.1002/etc.3257>.

⁴⁹ Gabriel T. Harmon, Alexandra N. Harmon-Threatt, & Nicholas L. Anderson, *Changes in predator biomass may mask the negative effects of neonicotinoids on primary consumers in field settings*, 16, 2 *Insect Conservation and Diversity*, (Dec. 28, 2022), <https://doi.org/10.1111/icad.12625>.

⁵⁰ See, e.g., Daniel Schläppi et al., *Long-term effects of neonicotinoid insecticides on ants*, 3 *Commun. Biol.* 335 (2020), <https://doi.org/10.1038/s42003-020-1066-2>.

⁵¹ Beatrix Bradford, *Neonicotinoid-containing insecticide disruption of growth, locomotion, and fertility in *Caenorhabditis elegans**, 15, 9 *PLoS One* e0238637 (Sept. 9, 2020), <https://doi.org/10.1371/journal.pone.0238637>.

⁵² Zihe Wang et al., *The neonicotinoid insecticide imidacloprid has unexpected effects on the growth and development of soil amoebae*, 869, 15 *Science of The Total Environment* 161884 (Apr. 15, 2023), <https://doi.org/10.1016/j.scitotenv.2023.161884>.

⁵³ Heidi Sjursen Konestabo et al., *Pesticide effects on the abundance of springtails and mites in field mesocosms at an agricultural site*. 31 *Ecotoxicology* 1450–1461 (2022), <https://doi.org/10.1007/s10646-022-02599-3>.

⁵⁴ Kirsten A. Pearsons & John F. Tooker, *Preventative Insecticide Use Affects Arthropod Decomposers and Decomposition in Field Crops*, 157 *Applied Soil Ecology* 103757, (Jan. 2021), <https://doi.org/10.1016/j.apsoil.2020.103757>; Daniel Rath & Aditi Dubey, *How Neonics Harm Earthworms*, NRDC (Apr. 18, 2024), <https://bit.ly/4cG6UDD>; Daniel Rath, *How Neonics Can Harm Soil Health and Soil Biodiversity*, NRDC (Dec. 5, 2023), <https://bit.ly/4f2DmRm>; Written testimony of Professor John Tooker, Pennsylvania State University College of Agricultural Sciences, to the NYS Standing Committee on Environmental Conservation (Sep. 23, 2021), <https://bit.ly/40JHQ9>.

⁵⁵ Daniel Rath, *How Neonics Can Harm Soil Health and Soil Biodiversity*; see also Margaret R. Douglas et al., *Neonicotinoid Insecticide Travels Through a Soil Food Chain, Disrupting Biological Control of Non-Target Pests and Decreasing Soya Bean Yield*, 52, 1 *Brit. Eco. Soc.* 250-60 (Dec. 4, 2014), <https://doi.org/10.1111/1365-2664.12372>.

bacteria that are important for plant growth and improve soil fertility.⁵⁶ Farmers can reduce these threats to soil health by minimizing use of neonicotinoids, particularly as seed coatings that contribute significantly to soil contamination.

C. Reducing Neonicotinoid Use Supports Farm Productivity.

Neonicotinoid seed coatings can be eliminated while maintaining the productivity of the farm. Studies have shown that neonicotinoid seed coatings do not meaningfully increase yield in most field crops; where they do offer yield benefits, the economic benefit of increases is offset by the costs of the inputs.⁵⁷ Further, neonicotinoid use can actually reduce crop yields by killing natural predators of plant pests.⁵⁸ A study that reviewed of hundreds of side-by-side field trials found that neonicotinoid-coated seeds produced “substantial” risks to pollinators, but “no overall net income benefit” compared to untreated seeds.⁵⁹ An extensive field study in Canada reached similar conclusions.⁶⁰ Indeed, agronomists increasingly recommend against the prophylactic use of neonicotinoids across major field crops.⁶¹

In Quebec, where farmers are required to provide an “agronomic justification” for use of neonicotinoid seed coatings in major field crops,⁶² use of these seed coatings has dropped to near zero, without negative impacts on productivity.⁶³ In fact, after this

⁵⁶ Mona Parizadeh, Benjamin Mimeo, & Steven W. Kembel, *Neonicotinoid Seed Treatments Have Significant Non-target Effects on Phyllosphere and Soil Bacterial Communities*, 11 *Front Microbiol.* (Jan. 13, 2021), <https://doi.org/10.3389/fmicb.2020.619827>.

⁵⁷ Spyridon Mourtzinis et al., *Neonicotinoid Soybean Seed Treatments Provide Negligible Benefits to U.S. Farmers*, 9 *Scientific Reports* 11207 (2019), <https://doi.org/10.1038/s41598-019-47442-8>; see also Jacob R. Pecenka, *IPM Reduces Insecticide Applications by 95% While Maintaining or Enhancing Crop Yields Through Wild Pollinator Conservation*, 118 *PNAS* 44 (Oct. 25, 2021), <https://doi.org/10.1073/pnas.2108429118>.

⁵⁸ Penn State, *Insecticides Foster “Toxic” Slugs, Reduce Crop Yields*, (2014) <https://www.psu.edu/insecticides-foster-toxic>; Douglas et al., *Neonicotinoid Insecticide Travels Through a Soil Food Chain, Disrupting Biological Control of Non-Target Pests and Decreasing Soya Bean Yield*; Penn State, *Honeydew Contaminated with Systemic Insecticides Threatens Beneficial Insects* (2022) <https://www.psu.edu/news/agricultural-sciences/story/honeydew-contaminated>.

⁵⁹ Travis A. Grout et al., *Neonicotinoid Insecticides in New York State: Economic Benefits and Risk to Pollinators*, Cornell University 236 (Jun. 2020), <https://www.damascuscitizensforsustainability.org/wp-content/uploads/2018/06/0727-Accessible-Neonicotinoid-Assessment-compressed.pdf>.

⁶⁰ Jocelyn L. Smith, Tracey S. Baute, Arthur W. Schaafsma, *Quantifying Early-Season Pest Injury and Yield Protection of Insecticide Seed Treatments in Corn and Soybean Production in Ontario, Canada*, 113, 5 *Journal of Economic Entomology* 2197-2212 (Jul. 11, 2020), <https://doi.org/10.1093/jee/toaa132>.

⁶¹ See, e.g., Pecenka, *IPM Reduces Insecticide Applications by 95%*; Pierre Mineau, *Neonicotinoids in California: Their Use and Threats to the State’s Aquatic Ecosystems and Pollinators, with a Focus on Neonic-Treated Seeds*, 6 (Sep. 2020), <https://on.nrdc.org/3cl5nEK>.

⁶² O.C. 70-2018 § 11, https://www.publicationsduquebec.gouv.qc.ca/fileadmin/gazette/pdf_encrypte/gaz_entiere/1808-A.pdf.

⁶³ Marc Fawcett-Atkinson, “Inside Quebec’s fight over bee-killing pesticides,” (Jan. 31, 2025), *Canada’s National Observer*, <https://www.nationalobserver.com/2025/01/31/news/quebec-fight-neonics-bee-killing-pesticides>.

requirement went into effect in Quebec, corn and soy yields actually increased; similar improvements in yield were documented after a similar law went into effect in Ontario.⁶⁴

III. Colorado Farmers Who Avoid Neonicotinoid Seed Coatings Should Be Rewarded.

In summary, we appreciate Colorado's efforts to encourage farmers to adopt practices that protect ecosystems and soil health, and we urge CDA to maximize the impacts of these efforts by recognizing Use of Seed Without Neonicotinoid Coatings as a Qualified Stewardship Practice eligible for an Agricultural Stewardship Tax Credit.

Thank you for your consideration.

Respectfully,

Allison Johnson, Senior Attorney
Lena Freij, Staff Attorney
Natural Resources Defense Council

Hardy Kern, Director of Government Relations, Birds and Pesticides Campaign
American Bird Conservancy

Danny Katz, Executive Director
CoPIRG (Colorado Public Interest Research Group)

Henry Stiles, Advocate
Environment Colorado

Jason Davidson, Senior Food and Agriculture Campaigner
Friends of the Earth

Joyce Kennedy, Executive Director
People and Pollinators Action Network

⁶⁴ Scott McArt, Notes from the Lab: The Latest Bee Science Distilled (Mar. 2024), *available at* https://bpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/8/5278/files/2024/02/03-McArt-article_March2024-c3e0b3a12669895e.pdf.