Scientist Letter Concerning Recent Unsustainable Losses of Pollinators

Fall/Winter 2015

Dear Massachusetts Legislators,

As scientists, researchers and professors in a variety of fields including agroecology, agronomy, biology, chemistry, ecology, ecotoxicology, entomology, and sustainability sciences, among others, we would like to call your attention to recent unsustainable losses of pollinator populations. The 72 signers of this letter urge you to take immediate action to protect bees and other pollinators, particularly from pesticides known to be harmful by taking the following steps: support the Eight County President's Beekeepers Pollinator Protection Plan Framework created and supported by more than 3,000 beekeepers from the state of Massachusetts and submitted to the Department of Agricultural Resources for consideration to become the state's official Pollinator Protection Plan; pass restrictions on neonicotinoid pesticides by passing H.655, An Act Protecting Massachusetts Pollinators; increase investment in research and funding for implementation of alternatives, and non-pesticide alternatives to neonicotinoids and require large users of pesticides to report annually, in a manner accessible to the public, what, where, why and how much pesticide they have introduced into the Commonwealth's environment.

Since 2006, honey bees and other pollinators in the U.S. and around the world have experienced rapid population declines. Bees are responsible for one out of every three bites of food we eat.[1,2] In fact, 71 of the 100 crops that provide 90 percent of the world's food—from almonds to tomatoes and strawberries—are pollinated by bees.[3] Pollinators contribute $24 billion annually to the U.S. economy, honey bees account for $15 billion to the U.S. economy, and native pollinators (such as bumblebees, squash bees, and mason bees) contribute over $3 billion to the U.S. agricultural economy.[4] These declines of monitored species are indicative of parallel population losses to species difficult to monitor, the cumulative effect threatens the stability of our ecosystems, Massachusetts's agricultural economy, and our food supply.

Beekeepers across the country are facing unsustainable annual losses. According to the Bee-informed Partnership, the entire 12-month period between April 2014 and April 2015 yielded an average annual loss of 42.1%, which is the second highest loss recorded to date. [5] In Massachusetts, the losses are even higher at 46.4% with more bee colonies dying out over the summer than the winter. Beekeepers locally are struggling to keep their bees alive. This is why it is essential that you support the implementation of the Pollinator Protection Plan written by local experts in bee health, supported by over 3,000 beekeepers and submitted to the Department of Agricultural Resources for consideration. This plan's implementation will help the state protect its pollinators from future losses.

While climate change[6], pests[7], loss of habitat, diseases and other stressors[8] are all factors contributing to pollinator decline, a growing body of scientific evidence has identified exposure to neonicotinoid

[1] Klein AM, Vaissiere B, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C (2007) Importance of crop pollinators in changing landscapes for world crops. Proceedings of the Royal Society B: Biological Sciences 274: 303–313

[2]Buchmann S, Nabhan GP. 1996. The Forgotten Pollinators. Island Press, New York.

[3] United Nations Food and Agriculture Organization. 2005. Protecting the pollinators. FAO Spotlight. http://www.fao.org/ag/magazine/0512sp1.htm.

[4] White House Blog: New Steps to Protect Pollinators, Critical Contributors to Our Nation's Economy http://www.whitehouse.gov/blog/2014/06/20/new-steps-protect-pollinators-critical-contributors-our-nation-s-economy.

[5]Bee Informed Partnership. Colony Loss 2014-2015: Preliminary Results. http://beeinformed.org/2015/05/colony-loss-2014-2015-preliminary-results/

[6]Potts SG, Biesmeijer JC, Kremen C, Neumann P, Schweiger O, Kunin WE. 2010. Global pollinator declines: Trends, impacts, and drivers. Trends in Ecology & Evolution 25: 345–353; doi:10.1016/j.tree.2010.01.007.

[7] Cox-Foster DL, Conlan S, Holmes EC, Palacios G, Evans JD, Moran NA, et al. 2007. A metagenomic survey of microbes in honey bee colony collapse disorder. Science 318: 283–287; doi:10.1126/science.1146498.

pesticides—which are used on 140 crops and for cosmetic use in gardens—as a central factor that must be addressed if we are to reverse current trends of severe pollinator loss.[9]

A set of scientific reviews, known as the Worldwide Integrated Assessment of the Impact of Systemic Pesticides on Biodiversity and Ecosystems (WIA), involved 29 scientists reviewing over 1,120 studies, mostly on neonicotinoid insecticides. The WIA described these pesticides as significantly impacting "individual navigation, learning, food collection, longevity, resistance to disease, and fecundity" and concluded that neonicotinoids "are causing significant damage to a wide range of beneficial invertebrate species and are a key factor in the decline of bees."[10]In April 2015, the European Academies Science Advisory Council published a review of evidence that made a similar conclusion: current use of neonicotinoids has negative effects on a range of organisms that provide ecosystem services like pollination and natural pest control, as well as on biodiversity." It added that there is clear scientific evidence for sub-lethal effects of very low levels of neonicotinoids over extended periods on non-target beneficial organisms.[11]

Neonicotinoid insecticides: widespread usage, environmental contamination

Multiple routes of exposure to pesticides during the growing season have been identified for honey bees near agricultural fields.[12] Neonicotinoids are systemic pesticides that are used mainly in seed treatments, but are also applied as foliar sprays and directly to soil. These insecticides are absorbed by the plant and can be transported into stems, leaves, flowers and fruit. Neonicotinoid residues have been found in pollen, nectar and droplets of water exuded by the plant. [13,14,15] This feature makes the plant effectively toxic to insects that could potentially cause crop damage, resulting in protection for the plant.[16] However, this also results in increasing their exposure potential to pollinators. Neonicotinoid-laced dust released into the environment during the planting of coated seeds (for example, corn seeds) has been documented as an additional route of exposure.[17] Bees forage as far as 5 miles, which can lead them to come into contact with pesticides in a variety of locations.[18]

Neonicotinoids comprise at least 25% of the world's insecticide market globally[19]the neonicotinoid imidacloprid has the largest market share.[20]

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[8]Naug D. 2009. Nutritional stress due to habitat loss may explain recent honeybee colony collapses. Biological Conservation 142: 2369–2372.
[9]Mullin CA, Frazier M, Frazier JL, Ashcraft S, Simonds R, vanEngelsdorp D, et al. 2010. High Levels of Miticides and Agrochemicals in North American Apiaries: Implications for Honey Bee Health. F. Marion-Polled. PLoS ONE 5:e9754; doi:10.1371/journal.pone.0009754.
[10] Van der Sluijs, J. P. et al. Conclusions of the Worldwide Integrated Assessment on the risks of neonicotinoids and fipronil to biodiversity and ecosystem functioning. Environ. Sci. Pollut. Res. (2014).doi:10.1007/s11356-014-3229-5.
[11]European Academies Science Advisory Council.Ecosystem services, agriculture and neonicotinoids. 2015. ISBN: 978-3-8047-3437-1.
[12]Krupke, C. H., Hunt, G. J., Eitzer, B. D., Andino, G. & Given, K. Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields. PLoS ONE 7, e29268 (2012).
[13]Rortais, A., Arnold, G., Halm, M.-P. &Touffet-Briens, F. Modes of honeybees exposure to systemic insecticides: estimated amounts of contaminated pollen and nectar consumed by different categories of bees. Apidologie 36, 71–83 (2005)
[14]Girolami, V. et al. Translocation of neonicotinoid insecticides from coated seeds to seedling guttation drops: a novel way of intoxication for bees. J. Econ. Entomol. 102, 1808–1815 (2009).
[15] Goulson, D. REVIEW: An overview of the environmental risks posed by neonicotinoid insecticides. J. Appl. Ecol. 50, 977–987 (2013).
[16]Jeschke, P., Nauen, R., Schindler, M. & Elbert, A. Overview of the Status and Global Strategy for Neonicotinoids. J. Agric. Food Chem. 59, 2897–2908 (2011).
[17]Tapparo, A. et al. Assessment of the Environmental Exposure of Honeybees to Particulate Matter Containing Neonicotinoid Insecticides Coming from Corn Coated Seeds. Environ. Sci. Technol. 46, 2592–2599 (2012).
[18] C. R. Ribbands. The Flight Range of the Honey-Bee. J*ournal of Animal Ecology* Vol. 20, No. 2 (Nov., 1951), pp. 220-226 (1951). http://www.jstor.org/stable/1541
[19] Minnesota Department of Agriculture Pesticide and Fertilizer Management Division. Scoping A Review of Neonicotinoid Use, Registration, and Insect Pollinator Impacts in Minnesota. 2014. https://www.mda.state.mn.us/chemicals/pesticides/regs/~/media/Files/chemicals/reviews/scopingreviewneonic.pdf
[20]Congressional Research Service. Bee Health: The Role of Pesticides. 2015. http://fas.org/sgp/crs/misc/R43900.pdf

Neonicotinoids have an adverse effect on honey bees

Neonicotinoid-coated corn seeds have been identified as a direct cause of honey bee mortality, in the form of exposure to dust from the planting of coated seeds and droplets of water of corn plants germinated from coated seeds.[21,22]

Sub-lethal effects of neonicotinoids on homing ability, learning and foraging ability — all of which are skills contributing to the survival of bees and many other invertebrates — have been well documented or reviewed by multiple investigators— a few are cited here.[23,24,25]A plausible molecular mechanism by which neonicotinoids impair neural signaling has been proposed.[26,27]

Honey bees as indicators of impacts on non-target organisms

A consequence of massive neonicotinoid use is the potential chronic exposure for non-target organisms, including wild pollinators and a wide range of terrestrial and aquatic invertebrates. The WIA recently concluded, "Overall, the existing literature clearly shows that present-day levels of pollution with neonicotinoids caused by authorized uses (i.e. following label rates and applying compounds as intended) frequently exceed the lowest observed adverse effect concentrations for a wide range of non-target species and are thus likely to have a wide range of negative biological and ecological impacts. The combination of prophylactic use, persistence, mobility, systemic properties and chronic toxicity is predicted to result in substantial impacts on biodiversity and ecosystem functioning."[28]

Honey bee declines may be indicative of the larger problem of adverse impacts on populations of wild bees and other pollinators such as butterflies. While growers frequently rely on managed honey bees, studies indicate that wild pollinators provide valuable ecosystem services, in some cases fully pollinating crops.[29] A recent study examining 41 crop systems worldwide found that the contribution by wild pollinators to fruit set — which can be taken as a reliable predictor of crop yield — was independent of that made by managed honey bees, and that the contribution by wild pollinators was universally positive in all crop systems examined.[30]Concerns regarding potential impacts on other non-target organisms have been raised by the WIA and in a Nature article examining associations between high surface water concentrations of a neonicotinoid and declines of insectivorous birds in the Netherlands.[31]

A study conducted by the Insect Pollinators Initiative found "significant impairment of foraging behavior in bumblebees exposed to field realistic levels of neonicotinoids." Further, a study by the Universities of

[21] Girolami, V. et al. Translocation of neonicotinoid insecticides from coated seeds to seedling guttation drops: a novel way of intoxication for bees. J. Econ. Entomol. 102, 1808–1815 (2009).
[22]Tapparo, A. et al. Assessment of the Environmental Exposure of Honeybees to Particulate Matter Containing Neonicotinoid Insecticides Coming from Corn Coated Seeds. Environ. Sci. Technol. 46, 2592–2599 (2012).
[23]Sandrock, C. et al. Impact of Chronic Neonicotinoid Exposure on Honeybee Colony Performance and Queen Supersedure. PLoS ONE 9, e103592 (2014).
[24]Feltham, H., Park, K. & Goulson, D. Field realistic doses of pesticide imidacloprid reduce bumblebee pollen foraging efficiency. Ecotoxicol. Lond. Engl. 23, 317–323 (2014).
[25] Pisa, L. W. et al. Effects of neonicotinoids and fipronil on non-target invertebrates. Environ. Sci. Pollut. Res. (2014).doi:10.1007/s11356-014-3471-x
[26]Farooqui, T. A potential link among biogenic amines-based pesticides, learning and memory, and colony collapse disorder: A unique hypothesis. Neurochem. Int. 62, 122–136 (2013).
[27] Bees: biology, threats and colonies. (Nova Science, 2012).
[28] Van der Sluijs JP, et al. 2014. Conclusions of the Worldwide Integrated Assessment on the risks of neonicotinoids and fipronil to biodiversity and ecosystem functioning.*Environ SciPollut Res.* doi:10.1007/s11356-014-3229-5.
[29]Kremen, C., Williams, N. M. & Thorp, R. W. Crop pollination from native bees at risk from agricultural intensification. Proc. Natl. Acad. Sci. U. S. A. 99, 16812–16816 (2002).
[30]Garibaldi, L. A. et al. Wild Pollinators Enhance Fruit Set of Crops Regardless of Honey Bee Abundance. Science 339, 1608–1611 (2013).
[31]Hallmann, C. A., Foppen, R. P. B., van Turnhout, C. A. M., de Kroon, H. &Jongejans, E. Declines in insectivorous birds are associated with high neonicotinoid concentrations. Nature 511, 341–343 (2014).

Dundee and St Andrews found further evidence of neonicotinoids role in bee decline, specifically, the bees' ability to forage. Dr. Chris Connolly of the University of Dundee said: "Our research demonstrates beyond doubt that the level of neonicotinoids generally accepted as the average level present in the wild cause brain dysfunction and colonies to perform poorly when consumed by bumblebees."[32]

A recent Swedish field trial examined the use of neonicotinoids in real field conditions on oil seed rape and the effects on wild solitary bees, bumblebees and honey bees, and concluded that, "the use of neonicotinoid treated seeds in real field conditions has negative effects on wild bees, with potential negative effects on populations."[33]

The European Food Safety Authority recommended further evaluation of the health risks of the developmental neurotoxicity potential of the neonicotinoids acetamiprid and imidacloprid. They concluded that some neonicotinoids may affect the developing human nervous system by affecting functions such as learning and memory.[34]

Neonicotinoids have been shown, even at low levels, to impair foraging, navigational, and learning behavior in bees, as well as suppress their immune system to the point of increasing their susceptibility to pathogens and disease.[35]A 2015 study confirms previous findings that the levels of neonicotinoid pesticides bees are likely to encounter in the environment impair their brain cells, resulting in poor navigation and foraging, and eventually colony declines.[36]Similarly, University of Minnesota entomologist Vera Krischik, PhD, found that butterfly larvae feeding on neonicotinoid-contaminated milkweed plants died soon thereafter. Dr. Krischik notes that the potential risks to monarchs and other butterfly species when neonicotinoids are used in backyard plants near milkweed plants are serious cause for concern.[37] Butterflies, including the North American Monarch butterfly have experienced population declines by as much as 90 percent in the past 20 years, dropping from a high of approximately one billion in the mid-1990s to fewer than 35 million butterflies in the winter of 2013-2014– the lowest number ever recorded.[38]

Concentrations of neonicotinoids in soils, waterways, field margin plants, and floral resources overlap substantially with concentrations that control pests in crops, and commonly exceed levels that are known to kill beneficial organisms.[39] Because these chemicals are broad-spectrum insecticides, beneficial soil dwelling insects, benthic aquatic insects, grain-eating vertebrates, along with pollinators are also victims of these systemic chemicals. Birds are also at risk from neonicotinoids as one study demonstrates that a single corn kernel coated with a neonicotinoid is toxic enough to kill a

[32] Connelly, Chris. Bee brains and colony health jeopardised by pesticide exposure. 2015. University of Dundee. http://www.dundee.ac.uk/news/2015/bee-brains-and-colony-health-jeopardised-by-pesticide-exposure.php

[33]Raine, N., Gill, R. Ecology: Tasteless pesticides affect bees in the field. Nature 521, 38-40.http://dx.doi.org/10.1038/nature14391.(2015).

[34] EFSA Panel on Plant Protection Products and their Residues (PPR). Scientific Opinion on the developmental neurotoxicity potential of acetamiprid and imidacloprid. 11, 3471

[35]Harriott, N. 2014, Bees, Birds and Beneficials: How fields of poison adversely affect non-target organisms. Pesticides and You. Vol. 33, No. 4 Winter 2013-14.

[36] Moffat C, Pacheco, J G, et al. 2015. Chronic exposure to neonicotinoids increases neuronal vulnerability to mitochondrial dysfunction in the bumblebee (*Bombusterrestris*). *FASEB J fj.14-267179.doi:10.1096/fj.14-267179.*

[37]Gunderson, D. Feb 10, 2015. Early research links insecticide, monarch butterfly deaths. MPR News. http://www.mprnews.org/story/2015/02/10/butterfly-deaths-neonicotinoids.

[38]Main, D. Monarch Butterflies Have Declined 90%; Conservationists Seek Extra Protection. Newsweek. 27, August, 2014. http://www.newsweek.com/monarch-butterflies-have-declined-90-conservationists-seek-extra-protection-267094

[39]Goulson, D. 2013. REVIEW: An overview of the environmental risks posed by neonicotinoid insecticides. *Journal of Applied Ecology*.50: 977–987.doi: 10.1111/1365-2664.12111.

songbird.[40]Further, research from the Netherlands has showed that the most severe bird population declines occurred in those areas where neonicotinoid pollution was highest.[41]

New research by the U.S. Geological Survey (USGS) documents that neonicotinoids are present in our waterways. The USGS conducted a massive, 25-state and territory survey of neonicotinoid pesticide contamination in streams and found over half of steams tested, contained neonicotinoids.[42] In a similar study testing all Midwestern streams and rivers, including the Mississippi and Missouri Rivers, USGS found neonics were widespread in all waters tested, at levels toxic to aquatic life.[43] Recently, Morrissey at al. confirms these findings in a review, which found that neonicotinoid concentrations detected in aquatic environments pose risks to aquatic invertebrates and the ecosystems they support.[44]

Neonics have been detected in groundwater, storm-water ponds, tidal creeks and streams in levels up to 9 ppb (µg/l).[45,46] The results of a recent 2013 field-based aquatic microcosm study that investigated the effects of repeated pulses of the neonic imidacloprid showed that repeated short-term low concentrations of imidacloprid even at optimal conditions for photo degradation at low concentration levels may affect aquatic ecosystems, particularly Ephemeroptera and chironomid species.[47] Furthermore in another 2013 study that focused on the neonicotinoid thiadroprid, the populations of an aquatic invertebrate exposed over several generations to repeated pulses at low concentrations continuously declined and did not recover in the presence of a competing species.[48]

Neonicotinoids threaten aquatic invertebrates such as freshwater snails and water fleas, which are vulnerable to low exposures, acutely or via a variety of sub lethal mechanisms. A recent laboratory study has shown that imidacloprid is acutely toxic to larval crabs (megalopae) at low ppb concentrations (25 hr LC50 of 10 ppb) and even lower concentrations had sub lethal impacts such as fewer crabs surviving the developmental metamorphosis from larval to crab stages.[49] The study concluded that frequently molting juvenile crabs may be particularly vulnerable to these pesticides in estuaries. Another study regarding declines in macro–invertebrates (including slugs, snails, mayflies and crustaceans) concluded that based on their data from large-scale field monitoring during multiple years, serious concern is justified regarding the far-reaching consequences of the abundant use of neonicotinoid pesticides for aquatic ecosystems.[50]

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[40]Mineau P, Whiteside M. 2013. Pesticide Acute Toxicity Is a Better Correlate of U.S. Grassland Bird Declines than Agricultural Intensification. PLoS ONE 8(2): e57457.

[41]Hallmann CA, et al. 2014. Declines in insectivorous birds are associated with high neonicotinoid concentrations. *Nature* doi:10.1038/nature13531.

[42]Hladik, M.L., and Kolpin, D.W., 2015, First national-scale reconnaissance of neonicotinoid insecticides in streams across the USA: Environmental Chemistry, doi:10.1071/EN15061.

[43]U.S. Geological Survey.Insecticides Similar to Nicotine Widespread in Midwest. 2014. http://www.usgs.gov/newsroom/article.asp?ID=3941#.VYQyk0a2KN

[44]Morrissey, C. et al. 2015. Neonicotinoid contamination of global surface waters and associated risk to aquatic invertebrates: A review. *Environment International*. doi:10.1016/j.envint.2014.10.024.

[45]DeLorenzo, M.E., Thompson, B., Cooper, E., Moore, J. and Fulton, M.H. (2012).*Environmental Monitoring and Assessment*, 184, 343-359.

[46] Goulson, D. (2013). *Journal of Applied Ecology*, 50, 977-987.

[47]Colombo, V., Mohr, S., Berghahn, R. and Pettigrove, V.J. (2013).*Archives of Environmental Contamination and Toxicology*, 65, 683-692.

[48]Liess, M., Foit, K., Becker, A., Hassold, E., Dolciotti, I., Kattwinkel, M. amd Duquesne, S. 2013. *Environmental Science and Technology*, 47, 8862-8868.

[49]Osterberg, J.S., Darnell, K.M., Blickley, T.M., Romano, J.A. and Rittschof, D. (2012). *Journal of Experimental Marine Biology and Ecology*, 424-425, 5-14.

[50] 15 Van Dijk, T.C., Van Staalduinen, M.A and Van der Sluijs, J.P. (2013). PLoS ONE 8(5): e62374.

Cosmetic use and pesticides

Many of the plants and seeds sold in nurseries and garden stores across the United States have been pretreated with the pesticides at doses up to 120 times higher than are used on farms and continue "expressing" these pesticides in home gardens where they can continue to contaminate soil and be taken up by plants for months to years.[51] These nursery plants carry neither a list of pesticides used, nor do they carry a warning that these plants could harm pollinators.

A 2014 report, "Gardeners Beware 2014: Bee-Toxic Pesticides Found in "Bee-Friendly" Plants Sold at Garden Centers across the U.S. and Canada" shows that 36 out of 71 (51 percent) of garden plant samples purchased at top garden retailers in 18 cities in the U.S. and Canada purchased at Lowe's, Home Depot and Walmart, contain neonicotinoid pesticides at levels that have the potential to harm or even kill bees. Further, 40% of the positive samples contained two or more neonicotinoids.[52]

Imidacloprid has been shown to be expressed in nectar and pollen in soil treated plants like garden flowers at a much higher rate than it does for seed treated plants like corn. Imidacloprid in nectar from seed treated plants is typically expressed at less than 1 part per billion, while soil-treated plants have been shown to express the pesticide in nectar at levels as high as 40 ppb.[53] Troublingly, a food dose of just 20 ppb has been shown to destroy honeybee colonies.[54] While the large scale use of neonics in agricultural settings makes it the most common way bees are exposed to these pesticides, their use in gardens, lawns and landscapes may be an important contributing factor in declining bee and wild pollinator health.

Federal Action

In recognition of the long-term impacts systemic pesticides have on the environment, the U.S. Fish and Wildlife Service (FWS) announced in June 2014 it would phase out neonicotinoid use on the entire National Wildlife Refuge System by January 2016. U.S. Fish and Wildlife Service Chief James Kurth stated, "We have determined that prophylactic use, such as a seed treatment, of the neonicotinoid pesticides that can distribute systemically in a plant and can potentially affect a broad spectrum of non-target species is not consistent with Service policy."[55]

The Obama administration released its National Pollinator Health Strategy on May 19, 2015.[56] While the Plan is a step forward in acknowledging the critical nature of nationwide pollinator losses it fails to adequately address the impact of pesticides, including neonicotinoid insecticides. The Strategy outlines several goals, such as a focus on increased pollinator habitat, public education and outreach, and further research into a range of environmental stressors, including neonicotinoids. However, the well-

[51] Hopwood, J, Vaughan, M, Shepherd, M, Biddinger, D, Mader, E, Black, SH, and Mazzacano, C. 2012. Are Neonicotinoids Killing Bees? Xerces Society for Vertebrate Conservation. http://www.xerces.org/wp-content/uploads/2012/03/Are-Neonicotinoids-Killing-Bees_Xerces-Society1.pdf

[52] Brown, T., Kegley, S. Gardeners Beware 2014: Bee-Toxic Pesticides Found in "Bee-Friendly" Plants Sold at Garden Centers across the U.S. and Canada. Friends of the Earth.2014. http://libcloud.s3.amazonaws.com/93/72/9/4735/Gardeners-Beware-Report-2014.pdf.

[53]Krischik, V. A., A .Landmark, and G. Heimpel. 2007. Soil-applied imidacloprid is translocated to nectar and kills nectar-feeding Anagyruspseudococci (Girault) (Hymenoptera: Encyrtidae)Environ. Entomol. 36(5): 1238-1245.

[54]Keim, Brandon. "Controversy Deepens Over Pesticides and Bee Collapse." Wired Magazine, April 6, 2012. http://www.wired.com/wiredscience/2012/04/neonicotinoidscolonycollapse/?utm_source=Contextly&utm_medium=RelatedLinks&utm_campaign=Previous accessed 4/16/2013.

[55]James Kurth, Chief, National Wildlife Refuge System, FWS, Use of Agricultural Practices in Wildife Management in the National Wildlife Refuge System, July 2014. See http://www.centerforfoodsafety.org/files/agricultural-practices-in-wildlifemanagement_20849.pdf.

[56] . The White House. 2014. Presidential Memorandum-- Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators. June 20, 2014. Available: https://www.whitehouse.gov/the-pressoffice/2014/06/20/presidential-memorandumcreating-federal-strategy-promote-health-honey-b

intentioned strategy, while encouraging habitat, continues to allow for pesticides that can contaminate habitat and does not provide long term, unified protections for beekeepers.

As part of the plan, states have also been tasked with creating their own pollinator protection plans that rely heavily on notification requirements and best management practices for farmers, placing an undue burden on beekeepers. Emphasis on creating "physical and temporal space" between the use of pesticides and the presence of pollinators does little to address the chronic, sublethal threat of systemic, neonicotinoid pesticides. The White House announcement underscores the importance of pollinators and the impact their dwindling numbers will have on U.S. agriculture. However widespread, pervasive, systemic pesticide contamination continues to place pollinators at risk. In Massachusetts, a Pollinator Protection Plan Framework has been created and submitted by over 3,000 beekeepers to the Department of Agricultural Resources for consideration to become the state's official Pollinator Protection Plan. The implementation of this plan will help protect pollinators from the risks of systemic pesticides and other factors locally contributing to their decline.

Similarly, EPA released revised labels to protect honey bees by prohibiting the use of some neonicotinoid pesticides when bees are present, and the labels include a "bee advisory box" and icon with information on routes of exposure and spray drift precautions. The efficacy of the label change is questionable in curtailing exposure to a systemic pesticide that contaminates nectar and pollen for months to years, poisoning bees indiscriminately, and the enforceability of the label language, which is aimed at managed, not wild bees.[57]

Unrealistic and/or unenforced label requirements do not offer proclaimed protections. For instance, after specifying that, "The product may not be applied while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen," EPA adopted the loophole: "If an application must be made when managed bees are at the treatment site, the beekeeper providing the pollination services must be notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying." This puts the onus on the beekeepers to make sure their bees are safe.

Recommendations:

With less than adequate restrictions at the federal level, it is critical that Massachusetts lawmakers take action to lessen the impact on the state's fragile pollinator populations. We urge decisive action to protect bees and other pollinators and recommend that Massachusetts' lawmakers take the following actions in order to better protect bees and other valuable pollinators:

1. Adopt the Eight County President's Beekeepers Pollinator Protection Plan Framework created and supported by more than 3,000 beekeepers from the state of Massachusetts.
2. Pass restrictions on neonicotinoid pesticides by first passing H. 655, An Act Protecting Massachusetts Pollinators.
3. Increase investment in research and funding for implementation of alternatives, and especially non-pesticide alternatives, to neonicotinoids.

[57]U.S. Environmental Protection Agency. New Labeling for Neonicotinoid Pesticides. http://www2.epa.gov/pollinator-protection/new-labeling-neonicotinoid-pesticides

4. Require large users of pesticides to report annually, in a manner accessible to the public, what, where, why and how much pesticide they have introduced into the Commonwealth's environment.

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