THE MYSTERY OF THE DISAPPEARING HONEYBEE: WILL GOVERNMENT FUNDING AND REGULATION SAVE THIS IMPORTANT POLLINATOR?

Ann N. Coenen-Davis[*]

I. INTRODUCTION

America's honeybees are mysteriously disappearing. The winter months of 2006 started with heavy losses to the beekeepers in a handful of eastern states.[1] By February 2007 the beekeepers of twenty-five states reported significant bee

* J.D. Candidate, Drake University Law School, 2009.

1. RENEE JOHNSON, CRS REPORT FOR CONGRESS: RECENT HONEY BEE COLONY DECLINES 4 (2007).

colony deaths.[2] While the loss of mere honeybees may not seem like an event that would put the agriculture community on alert, bees mean more to agriculture than is realized by most. It is estimated that every third bite of food consumed by Americans is made possible by pollinators like the honeybee.[3] The loss of the honeybee would be devastating to a variety of crop growers that depend on these insects for a harvest worth fifteen billion dollars a year,[4] and to the American public who would be without adequate supplies of the many different fruits and vegetables that require pollinators.[5] The problem has gained attention because of its implications and mystery. Companies who depend on pollinated produce have started providing funding to research Colony Collapse Disorder (CCD), while those who worry the worst is yet to come post videos on YouTube warning of dire consequences if bees no longer existed.[6] Even the science fiction genre has come up with its own version of why bees are disappearing off the face of the Earth.[7]

This note examines the factors that may be causing CCD and how researchers believe factors could be linked in creating a disorder so serious and deadly that bees are succumbing to it at alarming rates. Pesticides, parasites, viruses and the migratory lives of bees kept in commercial operations are all possible suspects in the CCD puzzle. What can be discovered may determine how beekeeping and other aspects of agriculture are regulated in the future.

This note will also look at the efforts of the United States Department of Agriculture (USDA), and also the Pollinator Protection Act and the Pollinator Habitat Protection Act, both of which have come about as the attention of U.S. Senators and Representatives have been drawn to this grave problem. This por-

---

2. Genarao C. Armas, *Mystery Ailment Killing Honeybees*, FORTH WORTH STAR-TELEGRAM, Feb. 12, 2007, at A5; *see also* Zachary Huang, Quick FAQ on CCD, http://www.cyberbee.net/ccd.shtml (last visited Feb. 5, 2009) (noting that as of March 6, 2007, twenty-five states showed loss of honeybee colonies).

3. CNN.com, *Earth Matters: Pollinator Decline Puts World Food Supply At Risk, Experts Warn*, (May 5, 2000), http://archives.cnn.com/2000/NATURE/05/05/pollinators.peril/.

4. Susan Salisbury, *Bee Killer Imperils Crops*, PALM BEACH POST, March 28, 2005, at 1A.

5. *See generally Nature*: *The Silence of the Bees* (PBS television broadcast Oct. 28, 2007); *see also* PBS.org, Silence of the Bees: Update on Colony Collapse Disorder (Oct. 2007), http://pbs.org/wnet/nature/episodes/silence-of-bees/update-on-colony-collapse-disorder-oct-2007/41/.

6. *See, e.g.*, Häagen-Dazs, http://helpthehoneybees.com/#/howWeAreHelping/howWeAreHelping/ (last visited Feb. 5, 2009). A search of "colony collapse disorder" on www.YouTube.com on January 11, 2009, produced a list of 252 videos.

7. *Dr. Who: The Stolen Earth* (BBC One television broadcast June 28, 2008) (stating that the disappearing bees are returning home to different solar system, leaving a trail the title character follows to find the missing Earth).

tion of the note will also address alternative methods of regulating apiculture on a state level in light of some of the various theories about the causes of CCD.

II. THE MYSTERY OF COLONY COLLAPSE DISORDER

A. *The Importance of the Honeybee to Agriculture*

Honeybees are so important to agriculture in the United States that their pollination services are used in producing over ninety different kinds of crops on a commercial scale, resulting in a fifteen billion dollar yearly business that is on the increase.[8] The California almond crop alone, which depends entirely on honeybees for its pollination, requires 1.3 million hives and projections show that in five years 2.4 million might be needed to cover the almond blossoms.[9] Other fruits and vegetables require the talents of the honeybee as well. Citrus fruits, apples, blueberries, cranberries, onions, broccoli, carrots, watermelons, legume seeds, and strawberries are just a few of the types of produce that require the pollinators to produce their fruits.[10] Crops fed to animals are also pollinated by bees, such as the alfalfa and clover fed to cattle.[11] If the honeybee were to be seriously reduced or disappear entirely the effects on our diet would be astounding.[12] While wild pollinators could pick up some of the honeybees' work, agriculture has grown to the point that there are just too many crops for wild pollinators to handle alone.[13] At best we could expect to see extremely high prices and low supply of any fruit or vegetable requiring honeybee pollination and at worst our diet could lack many of the fruits and vegetables we currently enjoy.[14]

B. *What Is Colony Collapse Disorder?*

Beekeepers are no strangers to mysterious bouts of disappearing bees.[15] The first recorded large-scale loss of honeybees was in 1868 when Tennessee and

---

8. CCD STEERING COMM., USDA, COLONY COLLAPSE DISORDER ACTION PLAN 6 (2007), http://www.ars.usda.gov/is/br/ccd/ccd_actionplan.pdf.

9. *Id.* at 6.

10. JOHNSON, *supra* note 1, at 2.

11. *See id.*; Salisbury, *supra* note 4.

12. *See Nature*: *The Silence of the Bees*, *supra* note 5.

13. PBS.org, Silence of the Bees: Impact of CCD on U.S. Agriculture, http://www.pbs.org/wnet/nature/silence-of-the-bees/impact-of-ccd-on-us-agriculture/37/ (last visited Feb. 5, 2009).

14. *Nature*: *The Silence of the Bees*, *supra* note 5.

15. Robyn M. Underwood & Dennis vanEngelsdorp, *Colony Collapse Disorder: Have We Seen This Before?* 2, http://www.beeculture.com/content/ColonyCollapseDisorderPDFs/7%20Colony%20Collapse%20Disorder%20Have%20We%20Seen%20This%20Before%20-%20Robyn%20M.%20Underwood%20and%20Dennis%20vanEngelsdorp.pdf (last visited Feb. 5, 2009).

Kentucky beekeepers found their hives empty of bees, but full of honey.[16] Other mysterious losses of bees were reported in the United States, Europe and Australia at the turn of the last century, with no disappearing diseases reappearing until the 1960s and 1970s.[17] More recently, colony losses during the 1990s in the United States and France were attributed to poor hive management and pest control because healthy colonies were able to stay strong during these heavy losses while weaker colonies died off.[18]

The current massive die-off of honeybees, first reported by a Pennsylvania beekeeper whose colonies spent the winter months in the southern United States in 2006, is attributed to the serious loss of managed honeybee colonies across the United States.[19] Collapsed colonies are simply abandoned by the adult worker bee population, who disappears without a trace, leaving behind capped brood,[20] an egg-laying queen and her attendants.[21] Usually no bodies are found around the hive,[22] making it difficult to determine what caused the colony to collapse, and the few dead bees found have shown so many pathogens that researchers have not yet pinpointed a cause.[23] Even more puzzling to beekeepers is the lack of robbing by other colonies, who avoid the dead-out colony although the hive is left with plenty of stored honey and pollen.[24] Other types of insects avoid the hive too, as there is little evidence of invasion by pests that usually devastate hives, such as wax moths or small hive beetles.[25]

Migratory beekeepers keeping colonies in Texas, Florida, and California had substantial losses during the winter of 2006 to 2007 with as much as fifty percent of those losses attributable to the symptoms of CCD.[26] But the phenomenon did not stay confined to these three states for long. By the end of February

---

16. *Id.*
17. *Id.* at 2-3.
18. *Id.* at 3-4.
19. M. FRAZIER ET AL., FAQ'S: COLONY COLLAPSE DISORDER, *prepared for* MID-ATLANTIC APICULTURAL RESEARCH AND EXTENSION CONSORTIUM, http://maarec.cas.psu.edu/FAQ/FAQCCD.pdf (last visited Feb. 5, 2009).
20. Capped brood is the honeybee pupae. Once the larvae spin their cocoons and become pupae, the workers seal off the hexagonal compartment, or cell, of each pupa so that the pupa can develop into an adult bee. *See* BeeCARE.com, Honeybee Encyclopedia C, http://www.beecare.com/indexDynFrames.htm?http://www.beecare.com/Encyclopedia/Encyclopedia%20B.htm&1 (last visited Feb. 5, 2009).
21. CCD STEERING COMM., *supra* note 8, at 7.
22. FRAZIER ET AL., *supra* note 19.
23. Peter G. Kevan et al., *Colony Collapse Disorder (CCD) in Canada: Do We Have a Problem?*, 20 HIVELIGHTS 16, *available at* http://www.organicagcentre.ca/Docs/Colony_collapse_bees.pdf.
24. CCD STEERING COMM., *supra* note 8, at 7.
25. *Id.* at 8.
26. FRAZIER ET AL., *supra* note 19.

2007, non-migratory commercial beekeepers began to report that more than half of their colonies had been lost under mysterious circumstances.[27] It did not take CCD long to spread. By March 2007, accounts of CCD-like colony unexplained deaths had been reported in twenty-two states,[28] and by October 2007 it had been reported in thirty-five states.[29] In a survey of losses in fifteen states' apiaries, on average forty-five percent of colonies were lost to CCD.[30] By contrast only about twenty-five percent of dead-out colonies were considered to be normal losses common when hives are overwintered.[31] Representative results show that overall between 651,000 and 875,000 of managed colonies were lost nationwide out of a total estimate of 2.4 million managed colonies.[32] The disappearances continued as the 2008 almond pollination season drew near. Although there were enough bee colonies to pollinate this year's crop, there were last-minute losses in some beekeeper's colonies.[33] In fact, the bee population seemed to get stronger in January 2009, with beekeepers seeing some of the highest bee populations in three years. [34] But it was too soon to be optimistic that CCD might be in decline. Beekeepers began losing colonies in February 2009, with some operations going from thousands of colonies to around fifty or so within three weeks.[35]

---

27. *Id.*

28. *Review Colony Collapse Disorder in Honeybees Across the United States: Hearing Before the Subcomm. on Horticulture & Organic Agriculture of the H. Comm. on Agriculture*, 110th Cong. 124 (2007) [hereinafter *Hearing*] (statement of Richard Adee, Chairman of the Legislative Committee of the American Honey Producers Association).

29. *Nature*: *The Silence of the Bees*, *supra* note 5.

30. Dennis vanEngelsdorp et al., *An Estimate of Managed Colony Losses in the Winter of 2006-2007: A Report Commissioned by the Apiary Inspectors*, 147 AM. BEE J. 599, 599, 601 tbl. 3 (2007).

31. *Id.* at 600, 601 tbl. 3.

32. *Id.* at 602.

33. Kim Flottum, *Whew! Almond Pollination Is Going OK*, DAILY GREEN, Feb. 28, 2008, http://www.thedailygreen.com/environmental-news/blogs/bees/almonds-55022801?click=main_sr.

34. Kim Flottum, *US Beekeepers Have More Bees Than Any Time in Three Years*, DAILY GREEN, Jan. 29, 2009, http://www.thedailygreen.com/environmental-news/blogs/bees/colony-collapse-disorder-88012901.

35. Kim Flottum, *Colony Collapse Disorder Showing Up Again in East Coast Hives*, DAILY GREEN, Feb. 17, 2009, http://www.thedailygreen.com/environmental-news/blogs/bees/colony-collapse-disorder- 88021704.

C. *Causes of the Crisis*

1. Stressors

Stress in colonies is commonly noted by beekeepers at least two months before the onset of CCD.[36] Although the underlying factors of CCD still remain a mystery, researchers highly suspect stress as a factor of the disorder because of the immune-suppressing effects of stress on honeybees.[37] Stressors likely to affect bee immune systems are high infestations of varroa mites, poor nutrition, and pesticide use.[38]

The first potential cause of a weakened immune system is from the effects of the varroa mite on honeybee health. The varroa mite is an external parasite that feeds on the blood of larvae, pupae, and adult bees, leaving its hosts weakened at best, and severely deformed at worst.[39] Larva heavily infested with mites will develop into an adult bee whose deformations of wings and abdomen usually result in an inability to fly.[40] The bees that have only one or two mites feeding on them do not experience deformities, but they do become malnourished and susceptible to disease due to weak immunity.[41] The varroa mite weakens the host bee by suppressing its immune system as the mite feeds, making it more likely that any pathogens brought into the hive by the mite infestation will infect the host bee.[42] Hives weakened by the immunosuppressing effects of a varroa mite infestation could be more susceptible to a CCD-causing virus than healthy colonies without a serious mite infestation.[43]

Mite infestation is not the only cause of malnutrition in honeybee colonies. Due to urban sprawl and the growing of single crops on farms, bees are forced to forge on increasingly fewer types of crops instead of the variety of pollens that they need to maintain health.[44] Pollination is big business in the honey-

---

36. CCD STEERING COMM., *supra* note 8, at 7.

37. *Id.* at 1, 7.

38. *Id.* at 7.

39. MARYANN FRAZIER, VARROA MITES, *prepared for* MID-ATLANTIC APICULTURAL RESEARCH & EXTENSION CONSORTIUM (2005), http://maarec.cas.psu.edu/PDFs/Varroa_Mites_PMP1.pdf (last visited Feb. 5, 2009).

40. *Id.*

41. *Id.*

42. *Virus Implicated in Colony Collapse Disorder in Bees,* SCIENCE DAILY, Sept. 6, 2007, http://www.sciencedaily.com/releases/2007/09/070906140803.htm; *Bee Mites Suppress Bee Immunity, Open Door for Viruses and Bacteria*, SCIENCE DAILY, May 18, 2005, http://www.sciencedaily.com/releases/2005/05/050517110843.htm.

43. *See Virus Implicated in Colony Collapse Disorder in Bees*, *supra* note 42.

44. Deane Morrison, *Trouble in Pollen Nation: Bee Shortage Renews Appreciation for Hard-Working Insect*, UMN NEWS, Apr. 11, 2007, http://www1.umn.edu/umnnews/Feature_

bee industry, with an estimated value of $15 billion annually and a large number of fruits and vegetables requiring honey bees to pollinate 90 to 100% of their flowers.[45] Migratory beekeepers, which are able to supply large amounts of bees for crops in bloom, make up the majority of pollination service providers.[46] Bees that are only able to gather pollen that does not support the nutritional needs of the hive can develop malnutrition, resulting in weakened colonies.[47] Honey bees require a variety of quality pollens containing protein to raise a fall generation strong to ensure the colony will survive the cold winter months.[48] Expecting the bees to sustain themselves and maintain a strong colony on one kind of pollen at a time would be like requiring a dog to remain healthy on a diet of nothing but bread.[49] Yet the trend of growing more and more of the same crop and the use of herbicides to ensure no weeds grow in the fields leaves bees with little variety in their diet while pollinating crops.[50] Meanwhile, the urbanization of rural areas leads to shrinking amounts of bee pasture that provides a variety of pollens to the bee colonies pollinating crops grown in the absence of other types of pollen-producing plants.[51] For example, bees that pollinate the California almond crop do not have the opportunity to collect the diversity of pollen and nectar needed to keep the colony healthy due to the use of herbicides and lack of bee pasture.[52] Instead they must subsist on corn syrup and soy protein substitutes given to them by beekeepers, and whatever nutritional value they can get out of almond blossom pollen.[53] Substitute foods are not the best source of protein for bees, and prolonged feeding of artificial foods results in bees with a shorter lifespan than those who can feed on pollen.[54] Artificially fed bees' weakened immune systems and malnourished bodies cannot fight off pathogens and parasites as well as their

---

Stories/Bee_shortage_points_up_hardships_in_the_hive.html. *See also* Gina Covina, *Nobody Home*, TERRAIN (2007), http://ecologycenter.org/terrain/article.php?id=13601.

45. JOHNSON, *supra* note 1, at 2.

46. *Id.*

47. *See* Univ. of Cal., Davis Dept. of Entomology, *Bee Specialist Eric Mussen Fingers Prime Suspects in 'BSI: The Case of the Disappearing Bees* (Oct. 16, 2007), http://entomology.ucdavis.edu/news/dssericmussen.html.

48. Covina, *supra* note 44. *See also* Univ. of Cal., Davis Dept. of Entomology, *supra* note 47.

49. *Nature*: *The Silence of the Bees*, *supra* note 5.

50. *See* Covina, *supra* note 44.

51. *Hearing*, *supra* note 28 (statement of Gene Brandi, Legislative Chairman of the California State Beekeepers Association).

52. *See generally* Covina, *supra* note 44.

53. *Id.*

54. *See* Doug Somerville, *Honeybee Nutrition and Supplementary Feeding*, NEW S. WALES AGRIC. 4-5 (2000), http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/117494/honey-bee-nutrition-supplementary-feeding.pdf.

pollen-fed, healthier counterparts.[55] Healthy bees are especially important because bees naturally suffer from a limited immune system.[56] Thus, proper nutrition is important because strong colonies that can meet their nutritional needs have better immune systems and resist diseases better than weak, malnourished hives.[57]

Furthermore, the stresses brought on by the need to travel long distances in unnatural conditions to pollinate crops means the very nature of the migratory beekeeping industry could be a factor in CCD. Migratory beekeeping is the practice of moving bee colonies "from one locality to another during a single season to take advantage of two or more honeyflows [, times and places where nectar and pollen are in abundance,] [58] or to lease out the colonies for pollination services to agricultural producers."[59] To move bees, beekeepers stack hives on flatbed trucks, sometimes with hive entrances screened to confine the bees to their hives, as required by some state laws.[60] Travel over long distances can expose bees to temperature fluctuations, causing the hives to overheat and stress.[61] Screened hives mean bees cannot leave to get water, which they use to cool the hive.[62] Hot hives are not the only problem. Confinement itself results in higher levels of carbon dioxide and humidity within the hives, causing stress bees would not experience if they were not moved.[63] The hives themselves are placed close together to prevent any accidents caused by any shifting of the hives on the flatbed.[64] Bees that are not confined to their hives will cluster outside the hives due to rough rides or during hot weather.[65] This clustering of bee in close quarters brings bees from different colonies in contact with one another, increasing the chances that a pathogen-carrying bee could pass that pathogen to stressed bees from healthy colonies.[66]

---

55. *See* Univ. of Cal., Davis Dept. of Entomology, *supra* note 47.
56. *See id.*
57. *See generally id.* (discussing how malnutrition affects bees' ability to stay healthy).
58. BeeCARE.com, Honeybee Encyclopedia H, http://www.beecare.com/indexDyn Frames.htm?http://www.beecare.com/Encyclopedia/Encyclopedia%20H.htm&1 (last visited Feb. 5, 2009).
59. BeeCARE.com, Honeybee Encyclopedia M, http://www.beecare.com/indexDyn Frames.htm?http://www.beecare.com/Encyclopedia/Encyclopedia%20M.htm&1 (last visited Feb. 5, 2009).
60. MID-ATLANTIC APIARY RESEARCH & EXTENSION CONSORTIUM, MOVING BEES (2005), http://maarec.cas.psu.edu/PDFs/Moving_Bees.pdf (last visited Feb. 5, 2009).
61. *Id.*; Kevan, et al., *supra* note 23, at 14.
62. MOVING BEES, *supra* note 60; Kevan, et al., *supra* note 23, at 14.
63. Kevan, et al., *supra* note 23, at 14.
64. MOVING BEES, *supra* note 60.
65. *Id.*
66. Kevan, et al., *supra* note 23, at 14.

It is not just the conditions, but the actual move itself that can cause stress. Bees also experience bumps from road travel and vibrations from the vehicle's engine as they are trucked across the country.[67] Some beekeepers believe the engine vibrations help keep the bees calm during loading and unloading.[68] But critics claim such vibrations and the shocks felt during travel add to the stress of the move.[69] Also, the very act of taking bees across timelines in a short amount of days could induce a jet lag that upsets the bees.[70] Like other animals, bees have regular daily rhythms and need to sleep.[71] The long-distance moving of colonies could result in upset, jet-lagged hives that are more susceptible to factors causing CCD.[72] If the stress of moving does have a serious negative effect on colonies, finding ways to make moves less stressful for honeybees could help combat CCD.

2. *Pesticide Use*

Researchers are also examining the use of neonicotinoids in the search for CCD factors.[73] Neonicotinoids are "chemicals designed to mimic the toxic effects of a neurotoxin from the tobacco family."[74] Neonicotinoids have been deemed nearly non-toxic to vertebrates, but pose problems for invertebrates, like the honeybee.[75] While small doses do not adversely affect bees' ability to learn, large amounts result in intoxicated bees that are unable to learn vital skills needed by those workers who venture outside the hive to perform their duties.[76] Bees use their ability to learn to orient themselves to the hive's location by remembering the surrounding landscape and using it to guide them back to the correct hive.[77] A bee suffering from memory loss caused by neonicotinoids is not a bee who can find her way home.[78] If enough bees from a hive are not returning home, hives empty of adult workers, a sign of CCD.

---

67. *Id.*
68. MOVING BEES, *supra* note 60.
69. Kevan, et al., *supra* note 23, at 14.
70. *Id.*
71. *Id.*
72. *See id.*
73. *See* Univ. of Cal., Davis Dept. of Entomology, *supra* note 47.
74. *Id.*
75. *Id.*
76. *Id.*
77. News Release, Gary W. Hickman, Horticulture Advisor, Univ. of Cal. Coop. Extension, How Do Bees Find Their Nest?: Backyard Horticulture (Aug. 14, 2002), *available at* http://cemariposa.ucdavis.edu/newsletterfiles/Backyard_Horticulture1484.pdf.
78. *See Hearing*, *supra* note 28, at 27 (statement of Gene Brandi).

Other toxic pesticides are detrimental to bees because they affect the fertility of queen bees and drones, cause deformed brood, and affect the hive through other means.[79] For example, contaminated nectar and pollen brought back to the colony by field bees can lead to the poisoning of the colony's residents, from larvae to other adult bees working within the hive.[80] One field bee returning to the colony with contaminated pollen and nectar will probably poison only a few other workers in the hive, but many bees returning with pesticide-laced forage can affect the whole hive's population.[81] Tests done at USDA labs have shown that pollen brought back from just one source can contain up to forty different chemicals.[82] Furthermore researchers in France have found pesticide poisoning causes some of the exact same symptoms that are observed before the onset of CCD, such as lack of foraging and reluctance to feed on food provided by the beekeeper.[83] Although an outright lethal poisoning is evidenced by the presence of dead bees around the hive,[84] a sub-lethal dose of pesticides could be a factor in opening the door to hive collapse, especially if such pesticides as neonicotinoids cause bees to forget their way home after foraging flights.[85]

3. Disease

In September 2007, researchers discovered a strong link between Israeli Acute Paralysis Virus (IAPV) and CCD.[86] The virus, which Israeli researchers say causes an adult bee's wings to shiver, eventually leaves the bee paralyzed before it finally crawls outside the hive to die.[87] It has not been proven to be a cause of CCD. However, it is a key virus found in almost all samples taken from CCD-affected apiaries.[88] While IAPV may be a source of CCD, discovering what may be causing IAPV to possibly develop into CCD could prove difficult because of the many stressors experienced by managed colonies, and the fact that viruses were not known to be a serious threat to honeybees before now.[89] Seven

79. *Id.*

80. *See* H. RIEDL ET AL., PAC. NORTHWEST EXTENSION, HOW TO REDUCE BEE POISONING FROM PESTICIDES 2 (2006), http://extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf (listing symptoms of pesticide poisoning from larvae to adult bees).

81. *Id.* at 3.

82. *Nature*: *The Silence of the Bees*, *supra* note 5.

83. *Id.*

84. RIEDL ET AL., *supra* note 80, at 2.

85. Underwood & vanEngelsdorp, *supra* note 15, at 4.

86. PHYSORG.com, Bee Researchers Close in on Colony Collapse Disorder, http://www.physorg.com/pdf108307363.pdf (last visited Feb. 5, 2009).

87. *Id.*

88. *Id.*; PBS.org, Update on Colony Collapse Disorder, *supra* note 5.

89. PBS.org, Update on Colony Collapse Disorder, *supra* note 5.

other viruses, a host of other bacteria and parasites, lack of nectar caused by droughts, and migratory beekeeping might be working with IAPV to produce CCD.[90] As noted above, IAPV causes wing-shivering and paralysis, which means bees die near the hive, while CCD produces few to no bodies around the hive, showing that IAPV alone is likely not the cause of the collapses.[91] Researchers still need to discover how exactly IAPV became such a serious factor in causing colonies to collapse.[92] USDA scientists are now attempting to infect healthy colonies with CCD to determine what pathogens and stressors may be causing IAPV to become a serious threat to the honeybee.[93]

The pathogen theory took an interesting twist in February of 2009, when it was discovered collapsing Florida colonies showed changes in the number of viruses present in the bees decreased as a hive collapsed. [94] *Nosema*, a disease caused by a certain form of protozoan, was found in the colonies, but not at lethal levels, along with seven to nine other viruses. [95] But as the colonies collapsed further, the number of diseases present diminished until only one or two remained, the number usually present in healthy colonies. [96] Yet other colonies in Florida showed *Nosema* at lethal levels and an infestation of varroa mites, indicating that scientists might not be any closer to solving this puzzle despite the discovery of IAPV.[97]

Focusing on a pathogen as the cause of CCD started with the discovery that combining collapsing colonies with healthy colonies caused the healthy co-

---

90. Andrew C. Revkin, *Scientists See Suspect in Mass Deaths of Bees*, N.Y. TIMES, Sept. 6, 2007, at A18.

91. PHYSORG.com, *supra* note 86.

92. *Nature*: *The Silence of the Bees*, *supra* note 5.

93. *Id.*

94. Kim Flottum, *Colony Collapse Disorder Showing Up Again in East Coast Hives*, DAILY GREEN, Feb. 17, 2009, http://www.thedailygreen.com/environmental-news/blogs/bees/colony-collapse-disorder- 88021704.

95. Kim Flottum, *Colony Collapse Disorder Showing Up Again in East Coast Hives*, DAILY GREEN, Feb. 17, 2009, http://www.thedailygreen.com/environmental-news/blogs/bees/colony-collapse-disorder- 88021704; Nosema, http://www.ent.uga.edu/Bees/Disorders/Nosema.htm. http://maarec.cas.psu.edu/bkcd/bee_diseases/nosema.html (*Nosema* develops in the midguts of all classes of honeybee, shortening the life of the infected bee. It causes reduced honey yields and lower colony populations).

96. Kim Flottum, *Colony Collapse Disorder Showing Up Again in East Coast Hives*, DAILY GREEN, Feb. 17, 2009, http://www.thedailygreen.com/environmental-news/blogs/bees/colony-collapse-disorder- 88021704.

97. Kim Flottum, *Colony Collapse Disorder Showing Up Again in East Coast Hives*, DAILY GREEN, Feb. 17, 2009, http://www.thedailygreen.com/environmental-news/blogs/bees/colony-collapse-disorder- 88021704.

lonies to collapse as well.[98] In fact, it is now recommended by the CCD Working Group that colonies not be combined to prevent the spread of potential infectious agents.[99] However, some are urging researchers to not ignore pesticides as a factor of CCD.[100] Researchers claim the recent discovery that irradiated hives could be safely repopulated points to an infectious agent.[101] However, critics claim pesticides could still be involved as irradiation can also break down chemical residues on comb, honey, and pollen.[102] Scientists at Bayer Cropscience confirm that one type of sprayed pesticide does break down quickly when exposed to sunlight.[103] While IAPV is a likely suspect in the search for pathogens and factors of CCD, it is not the only one and research should still continue to focus on other potential causes until more definitive answers are found.[104]

III. GOVERNMENTAL INVOLVEMENT IN THE FIGHT AGAINST CCD

A. *The USDA Takes Notice*

In June 2007, the USDA announced its action plan designed to help combat the devastating effects of CCD on a federal government level.[105] Four main components were addressed: 1) survey and data collection needs; 2) analysis of samples to determine the prevalence of parasites, diseases or pesticide exposure; 3) experiments to analyze the possible causes of CCD; and 4) mitigation and prevention through developing ways to improve bee health.[106] Very little honeybee research is done by private entities, so the need for USDA-directed and federally funded research of CCD has become vitally important as the disorder becomes more serious.[107] Various research arms of the USDA and the entomology departments of several universities across the nation are now working together in a coordinated effort to analyze data collected for any possible factor of the

98. CCD STEERING COMM., *supra* note 8, at 7.

99. DENNIS VANENGELSDORP ET AL., TENTATIVE RECOMMENDATIONS FOR HIVES EXPERIENCING CCD (Mar. 7, 2007), http://www.datcp.state.wi.us/arm/environment/insects/apiary/pdf/CCDRecommendationsMarch2007.pdf.

100. *See* James Fischer, *A Beekeeper Reads the Paper* 3 (2007), http://www.beeculture.com/content/Reads_The_Paper.pdf.

101. Revkin, *supra* note 90.

102. FISCHER, *supra* note 100, at 3.

103. *Id.*

104. *See id.* at 4 (explaining other causes, such as pesticides and other diseases, could be as much to blame for CCD as IAPV).

105. *See generally* CCD STEERING COMM., *supra* note 8, at 1.

106. *Id.* at 8.

107. *Hearing*, *supra* note 28, at 126 (statement of Richard Adee).

disorder in hopes of finding ways to correct it.[108] Several important discoveries have already been made as a result of this cooperation between the USDA and universities, including the discovery of the link between IAPV and CCD, and the development of a nutritional supplement for honeybees at the USDA's bee research center in Tucson, Arizona.[109] This supplement may help combat the malnutrition stress experienced by bees during extreme heat and drought, and times of travel.[110] If bee colonies that are given the nutritional supplement rebound, it could show that malnutrition-caused stress is an important factor in the development of CCD.[111]

The USDA is also providing more funding for honeybee research in the fiscal year of 2008 through a four-year long Coordinated Agricultural Project (CAP).[112] Four million dollars will be allocated for research on the health of managed honeybees.[113] The research, which will be conducted in cooperation with the extension community, is expected to be applied towards "genomics, breeding, pathology, immunology and applied ecology that explain the cause behind dwindling bee populations."[114] Another aspect of the CAP is to encourage the open exchange of information "in response to emerging areas of national priority and need."[115] For the 2007 fiscal year, $1.7 million was allocated for pollinator research and $7.7 million for the study of honeybee diseases, pests and nutrition.[116] It is hoped that this funding will help scientists discover ways to mitigate the current CCD crisis.

But CCD has been devastating bee hives since the winter months of 2006, and an action plan was only put together in June 2007.[117] Funding was allocated, as stated above, but the federal government's fiscal year of 2007 to 2008 did not start until October 2007.[118] That means several critical months passed where more research money could have been used to mitigate the crisis.

---

108. CCD Steering Comm., *supra* note 8, at 1, 8.

109. Revkin, *supra* note 90; Cary Blake, *Western Bee Experts Weigh in "Perfect Storm" Potential Cause of Honeybee Colony Collapse Disorder*, W. FARM PRESS, June 21, 2007, *available at* http://westernfarmpress.com/news/062107-bee-collapse/index.html.

110. Blake, *supra* note 109.

111. *Id.*

112. Press Release, Jennifer Martin, USDA, Cooperative State Research, Education, and Extension Service, USDA Announces New Funding for Bee Health and Protection (Sept. 11, 2007), *available at* http://www.csrees.usda.gov/newsroom/news/2007news/pollinatorcap.html.

113. *Id.*

114. *Id.*

115. *Id.*

116. *Id.*

117. *See* CCD STEERING COMM., *supra* note 8.

118. *See* BILL HENIFF, JR., CRS REPORT FOR CONGRESS, THE FEDERAL FISCAL YEAR (2003).

This governmental funding is vital because the beekeeping industry is made up mostly of small, family-owned apiaries that do not have the funds to support honeybee research, and, as a result, little research is done by the private sector.[119] With such dependence on the USDA's honeybee research, immediate and adequate funds are required to unravel the mysteries of CCD.

B. *Congressional Funding for CCD Research*

1. *Pollinator Protection Act of 2007 and Pollinator Habitat Protection Act of 2007*

Following hearings in the House Subcommittee on Horticulture and Organic Agriculture in March of 2007, U.S. Representative Alcee Hastings (D-FL) introduced in the United States House of Representatives the Pollinator Protection Act of 2007, House Bill1709, which proposed authorizing resources for the research of CCD.[120] Hastings stated concern for the country's food supply as a reason for sponsoring this bill, saying that future generations will not be able to afford the small amounts of agricultural produce that could be grown without the help of honeybees.[121] In fact, Congressional findings in House Bill 1709 itself found that the decline in pollinators to be "an issue of paramount importance to the security of the United States food supply system" and without a strong population of pollinators, like managed honeybee colonies, Americans would have to "rely more heavily on imported foods."[122] A heavy reliance on food grown outside of the United States could adversely affect the American food supply through price, availability and quality.[123]

To prevent a heavy reliance on imported food from becoming a reality, House Bill 1709 would authorize the Secretary of Agriculture to disperse funds for CCD research through the Agricultural Research Service.[124] Three million dollars per year from fiscal year 2008 through fiscal year 2012 would be appropriated for new personnel, improvement of current facilities, and research at the USDA's Apicultural Research Laboratories.[125] An additional $2.5 million would be granted for the fiscal years of 2008 and 2009 to research "honey bee physiolo-

---

119. *Hearing*, *supra* note 28, at 126 (statement of Richard Adee).

120. Press Release, U.S. Representative Alcee L. Hastings Introduces the Pollinator Protection Act (March 28, 2007), *available at* http://www.alceehastings.house.gov/index.php?option=com_content&task=view&id=97&Itemid=65.

121. *Id.*

122. Pollinator Protection Act, H.R. 1709, 110th Cong. § 2(2)-(4) (2007).

123. H.R. 1709 § 2(4).

124. H.R. 1709 § 3(a).

125. H.R. 1709 § 3(a)(1).

gy, insect pathology, insect chemical ecology, and honey bee toxicology" at USDA labs in hopes of determining the effects of pesticides and other environmental factors on the fragile internal processes of the managed honeybee.[126] A third source of funds, $1.75 million for the fiscal years of 2008 through 2010, would be used exclusively to identify and combat causes of CCD in the states affected with the disorder.[127] Finally, funds would be set aside for the Cooperative State Research, Education, and Extension Service (CSREES), an arm of the USDA which works through a network of extension offices in all states to advance knowledge of agriculture through research and education.[128] This appropriation would be $10 million given each year from the fiscal year 2008 to the 2012 fiscal year so that CSREES extensions can study honeybee immunology, physiology, ecology, and the sublethal effects of pesticides and genetically modified crops on beneficial insects through the use of USDA research grants.[129]

A similar version of the Pollinator Protection Act, Senate Bill 1694, was introduced in the Senate in June 2007 with minor changes to the funding scheme.[130] Senate Bill 1694 would split the $1.75 million grant for identifying and combating causes of CCD into two equal parts of $875,000 per fiscal year with the two parts going to support the research at the USDA's bee laboratories in Maryland and Arizona.[131] Unlike House Bill 1709, Senate Bill 1694 would require the Secretary of Agriculture to submit annual reports on the progress of bee research to the Committee on Agriculture of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry of the Senate and would also expand the CSREES provisions to include native pollinators and their habitats.[132]

Going hand in hand with the Pollinator Protection Act is House Bill 2913, the Pollinator Habitat Protection Act of 2007. Introduced in the United States House of Representatives on June 28, 2007, House Bill 2913 sought to increase habitat for both native and managed pollinators and encourage practices that protect the nation's pollinators.[133] The main thrust of the bill would establish conservation programs requirements meant to protect pollinators by inserting the following subsection into section 1244 of the Food Security Act of 1985:

---

126. H.R. 1709 § 3(a)(2).
127. H.R. 1709 § 3(a)(3).
128. CSREES.USDA.gov, About Us: CSREES Overview, http://www.csrees.usda.gov/about/background.html (last visited Feb. 5, 2009).
129. H.R. 1709 § 3(b).
130. *See* Pollinator Protection Act of 2007, S. 1694, 110th Cong. (2007).
131. S. 1694 § 3(a)(3).
132. S. 1694 §§ 3(b), 4.
133. Pollinator Habitat Protection Act of 2007, H.R. 2913, 110th Cong. §2(a) (2007).

(c) Native and Managed Pollinators.—In carrying out any conservation program administered by the Secretary, except the farmland protection program; the Secretary shall establish a priority and provide incentives for—

(1) increasing habitat for native and managed pollinators, especially native habitat; and

(2) establishing cropping systems, integrated pest management regimes, and other practices to protect native and managed pollinators.[134]

This bill does not create a new program or require new funds to function, but merely through its language would establish the habitat of pollinators as in need of conservation and would reward "producers whose conservation practices are beneficial for pollinators."[135] The recognition that native pollinators can take up some of the slack left by disappearing honeybee colonies is important to agriculture, even if native pollinators cannot handle all of the pollination honeybees perform. Literally hundreds of native bee species take part in crop pollination, sometimes doing all the pollination needed to produce a crop.[136] In fact, native bees do enough pollination of crops to be worth about three billion dollars annually to agriculture.[137] Such services could be invaluable if honeybee populations continue to decline.[138] As for the honeybees themselves, providing habitat can help alleviate some of the stress experienced during the pollination of crops that are not the best source of nutrition.[139] Habitat that provides a variety of pollens will ensure that those bees on pollination duty get the nutrition they need to stay healthy.[140]

2. *The Farm Bill*

The Pollinator Protection Act of 2007 and the Pollinator Habitat Protection Act were both incorporated into one version of the Farm, Nutrition, and Bioenergy Act of 2007.[141] This Amendment included Senate Bill 1694's protections

134. H.R. 2913 § 2(a).

135. Xerces Soc'y for Invertebrate Conservation, *Senate Pollination Habitat Protection Act of 2007*, May 24, 2007, http://www.xerces.org/2007/05/24/senate-pollinator-habitat-protection-act-of-2007/.

136. *Id.*

137. *Id.*

138. *See id.*

139. *See, e.g.*, Covina, *supra* note 42 (bees are fed soy protein and corn syrup to help fight malnutrition when pollinating crops do not provide them with needed nutrition).

140. *See Hearing*, *supra* note 28, at 27 (statement of Gene Brandi).

141. Farm, Nutrition and Bioenergy Act of 2007, H.R. 2419, 110th Cong. § 11315 (2007). *See also* Polinator.org, Farm Bill Pollinator Highlights, http://www.pollinator.org/Resources/HOUSE-PASSED%20FARM%20BILL%20POLLINATOR%20HIGHLIGHTS%20v2.pdf (last visited Feb. 5, 2009).

for native pollinators, and House Bill 2913's habitat conservation.[142] Unfortunately budgets were cut and economic incentives for farmers who manage their land in a bee-friendly manner no longer exist after Congressional negotiators reworked the final version of the bill.[143]

This final version of the bill, which eventually became the Food, Conservation and Energy Act of 2008, was passed into law over President Bush's veto in June 2008 without much funding for honeybee research.[144] In fact, only twenty million dollars was approved over the next five years and none of that amount is guaranteed for honeybee research.[145] By comparison, more than forty-three billion dollars will go to subsidize such crops as corn, cotton, soybeans, and wheat at a time when prices for commodity-based crops are at record highs.[146] The Act also provides for permanent disaster assistance for growers in the Northern Plains, an area of grasslands and prairies that is prone to drought and erosion.[147] This provides a big incentive in the form of guaranteed income to farmers who convert the grasslands and prairies set aside for conservation into fields, leaving bees and other pollinators with even less habitat and pollen variety.[148] The Act, which could have helped save the honeybee, has essentially harmed the insect.

The sustained funding proposed in the Pollinator Protection Act is sorely needed to keep honeybees healthy and in strong numbers. The Administration has already eliminated funds for honeybee research in past years and the budget for the fiscal year of 2008 again proposed more cuts in funding.[149] It is up to Congress to maintain and expand the funding that will keep crops pollinated in the future. Without necessary funding, answers to CCD will be slow coming, as CCD is not just a one-year phenomenon. In November 2007, colonies in Florida and California began collapsing again just three months before the almond bloom in California.[150] New symptoms are being seen as well, showing that while IAPV may be a key to CCD, it is not the only factor that needs to be investigated.[151]

---

142. Pollinator.org, *supra* note 141.

143. Alison Benjamin, *Last Flight of the Honeybee?*, GUARDIAN, May 31, 2008, at 52.

144. McClatch-Tribune, *Bee Colony Loss Called a "Crisis*," BALTIMORE SUN, June 27, 2008.

145. *Id.*

146. Martin Khor, *New U.S. Farm Bill Will Anger the World*, STAR, May 19, 2008.

147. Daniel Imhoff, *We'll Reap What We Sow*, L.A. TIMES, April 10, 2008.

148. Carolyn Lochhead, *Farm Bill Complicates Plight of Honeybees*, S.F. CHRON., Apr. 19, 2008, at A-1.

149. *Hearing*, *supra* note 28, at 127 (statement of Richard Adee).

150. Kim Flottum, *Colony Collapse Disorder: Back Again, Only Worse?*, DAILY GREEN, Nov. 20, 2007, http://www.thedailygreen.com/environmental-news/blogs/bees/colony-collapse-disorder-66112062.

151. *Id.*

Only with proper funding can the ever-changing mystery of this disorder be unraveled. It is up to Congress to heed the warnings of bee experts, see the threat for what it is, and reintroduce the Pollinator Protection Act and the Pollinator Habitat Protection Act. The funding and conservation are greatly needed if we are to keep having a diverse supply of nutritious foods at reasonable prices.

C. State Regulation

Congress' disagreement with the President over the Farm Bill, and the fact that the vast majority of bee research is done in federal labs, means that states might have to take a more hands-on approach to reducing bee stress and keeping CCD out of unaffected areas. Many states have recognized that pesticides pose a great risk of harm to honeybees and regulate to reduce harm to bees.[152] Other states have regulations, such as requiring a certificate of inspection, meant to prevent the spread of diseases or pests not present within the state.[153] The use of such regulations could keep CCD from spreading to states that currently remain unaffected by the disease and help prevent bee exposure to pesticides that may be a culprit in CCD.[154]

1. California's Regulation of Pesticides

While many states have regulations intended to protect bees from pesticide applications, California has more stringent regulations on the books.[155] Current research has not yet ruled out pesticides as a factor in CCD, making pesticide regulation important to keeping the managed bee population at strong levels.[156] Even if pesticides are not a factor in CCD, bees are often poisoned by the spraying of insecticides on blooming plants pollinated by bees.[157] Preventable deaths should not be allowed to occur while our need for bees to pollinate crops grows and the number of managed colonies declines.[158]

California tries to prevent inadvertent spraying of bees through communication between the pesticide user and the beekeeper, and prohibiting the spraying of bee-pollinated crops with pesticides toxic to bees during certain bloom

---

152. RIEDL ET AL., *supra* note 78, at 1.

153. *See, e.g.*, IOWA ADMIN. CODE r. 21-22.4 (2008).

154. *See* Terradaily.com, *Research Explores Link Between Pesticides and Colony Collapse Disorder*, TERRA DAILY, July 10, 2007, http://www.terradaily.com/reports/Research_Explores_Link_Between_Pesticides_And_Colony_Collapse_Disorder_999.html.

155. *See generally* CAL. FOOD & AGRIC. CODE § 29100-29103 (2007).

156. Terradaily.com, *supra* note 154.

157. RIEDL ET AL., *supra* note 80, at 2.

158. *See* CCD STEERING COMM., *supra* note 8, at 6.

times in specific areas of the state.[159] The California legislature first established that any pesticide label including the words "toxic to bees" was to be considered lethal to the insects regardless of level of toxicity.[160] The regulation also establishes what is considered to be the times bees are inactive – at night and when temperatures are below fifty-five degrees Fahrenheit – as well as the period of time most pesticide applications remain toxic to honeybees.[161] This ensures that the pesticides being applied are done so in a manner resulting in less harm to bees. Such regulations help foster an awareness of bee colonies, as most bee poisoning incidents are a result of a lack of awareness, not an intent to cause the colonies harm.[162] An awareness of the harm that can come to bees from pesticides could be critical if pesticides are a factor in CCD and the widespread effects of CCD are to be controlled.

Cooperation between the grower and the beekeeper is essential to keeping bees from being poisoned.[163] The California legislature recognized this and set up in its regulations a means of communication so that beekeepers can be informed when spraying is to occur. Beekeepers who desire to know when pesticides are going to be applied within a one mile area of their apiaries have the option of requesting advanced notice of the pesticide application.[164] The beekeeper wishing notification must be available for a two-hour period each day to receive these advance notices.[165] Those wishing to apply pesticides to blossoming plants must contact the commissioner for a list of beekeepers wanting advance notice and then must contact those beekeepers forty-eight hours before application with information about where and when the application will occur as well as the type of plant being treated, and the amount of acres.[166] This person must also be available for contact by the beekeeper.[167] With advance notification the beekeeper can take steps to protect her hives from harm, such as temporarily moving the hives out of harm's way or keep the bees confined during the application.[168] The contract required between the beekeeper and grower applying pesticides can help foster a good working relationship between them and help the beekeeper become familiar with the pest control practices used.[169] When one knows what

159. *See* CAL. CODE REGS. tit. 3, §§ 6654, 6656 (2008).
160. CAL. CODE REGS. tit. 3, § 6650(a) (2008).
161. CAL. CODE REGS. tit. 3 § 6650(b)-(c) (2008).
162. RIEDL ET AL., *supra* note 80, at 3.
163. *Id.*
164. CAL. CODE REGS. tit. 3, § 6652(a) (2008).
165. *Id.*
166. CAL. CODE REGS. tit. 3, §§ 6654(a)-(b) (2008).
167. CAL. CODE REGS. tit. 3, § 6654(b) (2008).
168. RIEDL ET AL., *supra* note 80, at 4-5.
169. *See id.* at 3-4.

the other is doing, few bees are affected by pesticides.[170] Thus, California attempts to foster this good working relationship between growers and beekeepers with contact regulations.

Finally, California has designated citrus/bee protection areas in three of its counties that extend in a mile radius of all citrus plantings.[171] During the bloom period, which starts when ten percent of the blossoms are open and ends when seventy-five percent of the flowers' petals have fallen off the trees' north sides, no pesticide toxic to bees may be applied without the written recommendation of the University of California's Agricultural Extension Service or licensed pest control.[172] Also, beekeepers in the protected area during the bloom are required to provide written notice of their hives' locations to the commissioner as well as updates when hives are moved or taken out of the protected area.[173] Pesticides not toxic to bees can be applied in accordance with regulations governing the general application of pesticides.[174] Bees pollinating the citrus crops are thus protected from the harmful effects of toxic pesticides and will not poison the entire hive by bringing contaminated nectar and pollen back to the colony.[175] If neonicotinoids and other pesticides are CCD factors, then that is one less stress pollinating bees will experience for the time they are at California's citrus groves. Unfortunately, not all bee-pollinated crops in California are designated protected areas, and bees could still be potentially exposed to toxic chemicals while pollinating almonds or other crops. Expanding this could be very beneficial to managed bee colonies and growers even if pesticides are not a cause of CCD. Restricting their use around bees might mean less colony losses in a time when the decline of bees has become a concern. Furthermore, if more states considered such progressive pesticide regulations to protect bees, then pesticide poisoning would be greatly reduced, especially for bees that travel the country pollinating various fruits and vegetables. While pesticides may or may not be a cause of CCD, any action that would help prevent a loss of bee colonies would aid in keeping the country's healthy bee population steady and strong enough to pollinate our food supply. Whether or not pesticides are a cause of CCD, growers and beekeepers need to be aware of pesticide applications and the locations of bee hives so that a good working relationship that keeps bees healthy and crops producing develops between the two industries. Regulations based on California's

170. *See id.* at 3.
171. CAL. CODE REGS. tit. 3, § 6656(a) (2008).
172. CAL. CODE REGS. tit. 3, §§ 6656(b) & (i)(2) (2008).
173. CAL. CODE REGS. tit. 3, § 6656(d) (2008).
174. CAL. CODE REGS. tit. 3, § 6656(c) (2008).
175. RIEDL ET AL., *supra* note 80, at 3.

statutes would help start this good working relationship by requiring communication between the two parties.

2. *Regulation of Diseases and Pests*

Many states, such as Iowa, have developed regulations intended to keep pests and diseases from harming their honeybee populations.[176] Such regulations could be modified to keep CCD out of states that are not experiencing the disorder.

Certificates of inspection ensure unwanted pests not native to Iowa are not brought in, and are required if honeybees are to be imported into the state.[177] Right now Iowa's regulation addresses only varroa mite infestation,[178] but as progress is made in discovering factors that contribute to CCD, a regulation like this could be modified to include inspection for diseases known to cause CCD. For example, as mentioned earlier, IAPV appears to be a key virus in the development of CCD,[179] and could be tested for hives coming into a non-CCD state. Honeybees at any stage of life being transported into a non-CCD state would have to be declared free of IAPV and have an approved certificate of inspection before being allowed into that state. In fact, states could require inspections for any pest or disease found to be connected to CCD. But with multiple factors being looked at as causing CCD, then the inspection process could get too complicated and costly to be effective. Inspection of honeybees coming into a non-CCD state would be effective only if one or two factors are found to be causing CCD.

Besides inspecting honeybees that come into the state, Iowa inspects any used apiary equipment offered for sale to make sure the equipment is free of infectious diseases and pests.[180] It has been recommended that as a preventative measure, equipment from CCD-affected hives be stored and not reused until there are methods of sterilization available.[181] The sale of equipment contaminated with viruses possibly causing CCD could lead to the spread of the disorder. As stated above, irradiation has been shown to make CCD-stricken hives useable by healthy colonies,[182] and it is possible scientists could find other methods of

---

176. *See, e.g.*, IOWA ADMIN. CODE r. 21-22.1-11 (2008) (Iowa's regulations regarding apiaries).

177. IOWA ADMIN. CODE r. 21–22.4 (2008).

178. IOWA ADMIN. CODE r. 21–22.4(1)-(2) (2008).

179. PHYSORG.com, *supra* note 86.

180. IOWA ADMIN. CODE r. 21-22.11 (2008).

181. DENNIS VANENGELSDORP, ET AL., *supra* note 99.

182. Fischer, *supra* note 100, at 3 (explaining that irradiation of CCD-affected hives can kill possible CCD-causing viruses and break down some types of pesticides).

sterilizing CCD-affected hives. If irradiation or another method of sterilization could be used efficiently and economically to rid used equipment of CCD, sterilization and inspection by authorities could be required before beekeepers sell their used equipment as a prophylactic measure to prevent the possible spread of CCD.

A more extreme regulation to prevent the spread of CCD would be prohibiting the importation of honeybees from CCD-affected states to a CDD-free state. Iowa temporarily banned the importation of honeybees, except honeybee queens and attendants accompanied by health certificates, from states experiencing problems with the small hive beetle, a honeybee pest.[183] Regulations could be promulgated that prevent the importation of honeybees in all stages of life from any state experiencing CCD into a state not affected by the disorder. If a virus is the key factor in the development of CCD, this preventative regulation would help keep the disorder from spreading to the handful of states free of CCD. But this may cause problems during the pollination season. For example, would colonies passing through on their way to pollinate crops, but not staying permanently in the state, be allowed to travel inside the state's borders? Regulations could simply require that all transported colonies travel with all hive openings screened to prevent any bee possibly suffering from CCD from drifting to or robbing any nearby hives if they happen to fly away from the colony.[184] Yet screening could just exacerbate potential CCD-causing stressors discussed earlier by keeping bees confined in hot hives with high carbon dioxide and humidity levels.[185] A state considering such a regulation would have to balance the potential harm caused by possible drifting of bees to nearby apiaries, which seems highly unlikely given the short distances bees actually travel,[186] with the actual stress put upon bees by keeping them confined to their hives for long periods of time.

IV. CONCLUSION

State regulation is not enough. While states can try to prevent the spread of CCD with pesticide regulation, and apiary inspections and quarantines, finding the cause of CCD is the only way to truly prevent its continued spread. With the beekeeping industry too small to financially support honeybee research, it must

183. *See* IOWA ADMIN. CODE r. 21–22.10 (2008).

184. Drifting is when bees return to the wrong hive after foraging. They are usually allowed entrance into the hive when carrying food, but sometimes are kept out by the hive's guard bees. *See* BeeCARE.com, Honeybee Encyclopedia D, http://www.beecare.com/indexDynFrames.htm?http://www.beecare.com/Encyclopedia/Encyclopedia%20D.htm&1 (last visited Feb. 5, 2009).

185. *See* Kevan, et al., *supra* note 23, at 14.

186. *See* Hickman, *supra* note 77 (noting that bees only travel one to two miles from their hive).

depend on the research being done by the USDA and its extensions to solve the CCD puzzle.[187] It is vital that Congress appropriates funding for the study of CCD in the USDA's labs. The two Farm Bill Amendments concerning the protection of pollinators must be reintroduced as freestanding bills if the Farm Bill itself fails to become law. Because many crops grown in the United States depend on bees for pollination,[188] it is imperative that the reason for the decline of managed honeybees is discovered and halted. Too much of our agriculture is riding on the wings of the honeybee to let CCD continue to devastate this important pollinator.

187. *See Hearing*, *supra* note 28, at 126 (statement of Richard Adee).
188. *See* Salisbury, *supra* note 4.