

**Committee: Environmental Sub-Commission 1**

**Issue: Combating the Colony Collapse Disorder**

**Student Officer: Abdullah Al Muhaisen**

**Position: Deputy President**

---

**INTRODUCTION**

“If the bee disappears from the surface of the earth, man would have no more than four years to live.” - Albert Einstein *“Quote Investigator”*

The “colony collapse disorder” is a phenomenon where the worker bees of a colony disappear; leaving behind an abundance of food, their queen bee and a few nurse bees that take care of the infants and queen bee. These occurrences are also known as “disappearing disease” or “autumn collapse” and have happened throughout history. It was later (in 2006) named the “colony collapse disorder”, a term which refers to a disintegration of bees in a concentrated area. This was first noticed by beekeepers in North America however, there were similar instances in Greece, Italy, the Netherlands, France, Spain and other countries.

This phenomenon is relatively new and extensive research has gone into finding out why this is happening. Over the years scientists have narrowed down a few key causes of the Colony Collapse Disorder such as pesticides specifically neonicotinoids, human activity, parasites, mites, and viruses. Environmentalists are still looking for a way to stop the decreasing numbers of honey bees by using the Environmental Protection Agency to raise awareness and invest money into more research on the topic.

**DEFINITION OF KEY-TERMS**

**Bee Colony:** An above ground nest for bees living and working in it consisting of worker bees, drones, larvae and a queen bee.

**Worker Bees:** Any female bee that is unable to reproduce and is specialized in the collection of food, maintaining the hive and caring for the larvae.

**Pollination:** This is the process where pollen is transferred from the anther (male part) to the stigma (female part) of a plant to cause fertilization in the plant and reproduction.

**Cross-Pollination:** To pollinate a plant with pollen given by another plant. This is done through bees taking the pollen of one plant to another to help it grow and sustain life.

**Pesticides:** A chemical substance that is used to destroy insects or other organisms that are harmful to plants or animals. Some specific pesticides are Neonicotinoids which will start to attack the bee from within its system slowly killing it.

**Neonicotinoids:** An agricultural pesticide that is used in plants and has recently been found to be related with the cause of colony collapse disorder. The process is that the bee pollinates a flower containing this chemical and slowly it begins to affect the bee in negative ways, ultimately leading to its death.

**Glazed:** When a larva is in the process of transforming into a fully grown bee there is a stage where the bee is fully covered in glaze to help it grow faster and to protect the larvae when growing.

## **BACKGROUND INFORMATION**

One of the big factors causing the decrease of bee populations are the different insects and parasites that attack bees individually, as well as their hives as a whole. The Varroa Destructor (from now on referred to as the ‘Destructor’), an external parasitic mite, originated in the Asian region but spread towards the western world and now is nesting in many of the hives in the United States. Although bees are higher in the food chain than these mites are when fully grown, the latter can be dangerous to bees, especially when the bees are still larvae. The moment a colony is infected, the mite feeds on the blood of the bees which significantly changes the way the bees function, e.g. paralysis, deterioration of a bee’s wings and breakdown

of abdomen and wings within a short period of time. When the wings are damaged, they will not be able to fly, which leads to the destruction of their hive. The Destructor attacks the larvae in the beginning by entering their skin before they are glazed. They do not kill the honey bees but weaken them and when they break out of the glaze they are too weak to move and the rest of the Destructors are set free to attack other bees.

### **Environmental and eco-system problems**

Bees are known as the nuisance that people have to deal with daily; however, they are one of the most helpful animals in our ecosystem by contributing to the world we live in. Bees make it possible for many of our favorite foods to make it to the table. Bees are one of the few animals that are called pollinators, which means that they transfer pollen from plant to plant and also creates cross-pollination that helps 90 percent of the world's plants. Without enough bees doing this, the majority of plants will die and affect the survival of our environment. If the number of bees decreases, most of the foods that are part of our everyday life will be very hard to find and as the plants die out, the oxygen levels will drop to dangerous levels.

Another environmental problem is that there is an Israeli virus called the Acute Paralysis virus that has spread considerably over the years attacking bees around the world, making it harder for them to survive. The virus first attacks their nervous system, paralyzing a part of them when they get born. This later continues until the bee is completely paralyzed and all of its body systems stop functioning leading to its inevitable death. Therefore, a solution must be found in order to eradicate the harm of this virus to bees.

### **Economical problems**

Bees also help from an economic standpoint because more than 15 billion dollars of crops a year in the United States are pollinated by bees instead of farmers. Additionally, 150 million dollars of honey is produced by honey bees annually. However, if the amount of bees globally decreases, the economy will be heavily affected, as it is estimated that the global economic cost of a bee decline is 6 billion dollars annually. To help keep the agriculture sector running smoothly with high quality production, it is crucial to keep bee populations safe.

## **Unemployment issues**

With the rapid reduction in bees around the world there will also be a lesser demand for beekeepers, which will inevitably increase unemployment. This can be a big issue because many beekeepers in the world will be heavily affected concerning financial issues and the productivity rate of the country will fall overall. Many of these beekeepers are also used to doing this job and specialize in the field of agricultural work and honey extraction. Thus, it will be harder for them to find a place in the workforce as they will not have many special skills, since they may not have received high level education or don't hold any specific degree.

## **MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED**

### **United States of America**

One of the biggest parties involved is the United States because of the heavy decrease in bees as reported by beekeepers. Over the past few years, the number of bee colonies has been decreasing. From the 5 million bees to start out with, the number has been halved over the years to 2.5 million and is still dropping dramatically. The reason they are crucial in the US is because people rely a lot on the food that bees produce. Currently they have had to import bees from New Zealand just to keep their food systems working. Another problem is that bees have saved the US over 15 billion dollars in the last year in pollination machines and agricultural costs. If they all die out there there will be a huge economical crisis.

### **Environmental Protection Agency (EPA)**

The Environmental Protection Agency is an organization whose main mission is to protect human health and the environment and has kept the Colony Collapse Disorder as one of their priority missions over the recent years. They have been continuously trying to increase awareness of the problem; in other words, why bees are so crucial to our survival and how we can help prevent further loss of life. They have also sent forward a bill, similar to the one passed by the United Kingdom, to try to put a ban on pesticides, specifically neonicotinoids, for a period of time as they have found a relationship between the pesticides and the death of bees.

This disease acts like nicotine for bees, while it slows down the internal organs and their normal biological functioning. It kills the bees from within. The EPA has tirelessly worked to prevent the state of panic that we are in now, but their main priority now is to try to save the bees we have.

### **Bayer CropScience**

Bayer CropScience is an organization that caters to the agricultural sector by producing different variations of pesticides and is now said to be one of the main causes of the colony collapse disorder. It produces neonicotinoids, which is (as previously stated) a pesticide that causes the death of many bees in the process of pollination. This is because the bees catch it in the air and then carry it back into their hives, thus affecting the whole colony and killing the entire hive. Currently Bayer is not allowed to sell their neonicotinoids until the end of 2015 due to a ban in the United Kingdom and, as this is their main source of income, they are frantically looking for alternative solutions for pesticides that do not harm bees. They have even launched a “Save The Bees” campaign to raise awareness and research the problem in depth.

### **United Kingdom and other European Countries**

The role of the United Kingdom is also substantial in this problem as their bees populations have decreased all over the country, as well France, Germany and Italy. This is a big problem as the diet of these countries relies on a great degree on what the bees produce. The UK has been raising awareness through campaigns and the government invested money to research about the causes and how to help prevent the Colony Collapse Disorder since it is such a new phenomenon.

**TIMELINE OF EVENTS**

<b>Date</b>	<b>Event</b>	<b>Outcome</b>
2005	Bee populations had been declining since 1997 but in the year of 2005 there was a steep decline which had alarmed many environmentalists and the agricultural workers that are co-dependent on honeybees to pollinate crops such as fruit and almond trees.	The outcome of this is that the ecosystem cannot work efficiently as bees have helped the environment tirelessly through pollination. Without enough bees something called a 'pollinator panic' is set off. This is when the level of pollination decreases to a dangerous level.
2007	The bee population continues to decline with some apiaries that reported a loss of 30 to 70 percent in different regions of the United States. This phenomenon was then given the name "the Colony Collapse Disorder" and potential causes were then debated. It was thought that pesticides were the main cause but viruses, fungus, climate change and phone signals were also possible factors.	There were further reports from beekeepers stating that there were significant losses in their colonies.
2008	There was research that was placed into the causes of colony collapse disorder which was focused into pesticides.	The US Natural Resource Defense Council filed a lawsuit against the Environmental Protection Agency for information that was unpublished about a pesticide by Bayer CropScience. It led to the publication of missing documents of the Federal Register.

2009	<p>There were campaigns to pick up momentum for the awareness of the importance of bees in the human food chain. In the United Kingdom there was a campaign launched called the “Plan Bee campaign” that demanded government action including research funded by the government about the colony collapse disorder. <a href="http://ExperienceProject.com">ExperienceProject.com</a> and Haagen-Dazs launched an advertising campaign to raise awareness about this world crisis.</p>	<p>The outcome of this is that there were various campaigns brought forth by the governments of countries to help by raising awareness and providing funds. France, Italy and Germany also suspended the use of neonicotinoids to help reduce the effects of colony collapse disorder as a precautionary measure.</p>
2011	<p>There were reports from the United Kingdom that it was another bad winter for the bee population. Research was conducted by the US Department of Agriculture, which found that the bees seal their cells in their combs just before the hives die off. It was stated that this was used as a defense mechanism and it is an effort to protect the hive from contaminants.</p>	<p>There were losses of up to 17 percent from colonies around the United Kingdom. Researchers found that there may be a link between pesticides and the colony collapse disorder. Research suggested that the cause of colony collapse disorder is not just one factor but may be any factors working together.</p>
2012	<p>There was extensive research connecting neonicotinoids pesticides and colony collapse disorder. One study showed that a ban of neonicotinoids reduced the number of deaths of bees and another study showed there is a link between bee deaths and pesticide treated seeds.</p>	<p>Other factors of bee death continued to be explored and researched as contributing factors such as hive destroying mites and viruses. Many studies found that pesticides make bees more vulnerable to viruses and pesticide companies such as Bayer CropScience created a care center for bees to further their research.</p>

2013	There was a huge celebration in the United Kingdom because of the bill allowing a two-year ban on pesticides of neonicotinoid. The progress towards the protection of bees is slow, but the awareness of the threat and the importance of bees to our survival is steadily increasing.	In the meantime the Bayer industry for pesticides is trying to have the approach for pro-bee pesticides. Studies also show that there are various ways for bees to be exposed to pesticides and that pollination-friendly alternatives are needed urgently. There was a national news story that in June thousands of bees were found dead in a car parking lot and awareness was raised through that.
------	--	--

**UN INVOLVEMENT: RELEVANT RESOLUTIONS, TREATIES AND EVENTS**

The United Nations had attempted to solve this issue, which was when they passed the bill in the United Kingdom which banned the use of neonicotinoids. This did show an increase in the number of bees but the bill will end at the end of 2015 so it was only a short-term solution.

**PREVIOUS ATTEMPTS TO SOLVE THE ISSUE**

In 2012 the United Kingdom environmentalists had created a bill in which there would be a ban on neonicotinoids for a period of time; however when it was put forward it failed as many of the members of parliament had turned a blind eye. When it was stated, the members simply said that there was not enough evidence to suggest that banning the pesticide would decrease the deaths of bees.

In the spring of 2013 however their bill passed when the European Union voted in favor of a two year ban of neonicotinoid pesticides. The Environmental Protection Agency also put forward a bill like this one in the United States, but the decision is still pending. This was an attempt to solve the issue but many environmentalists believe that this can be a short-term solution. In the end, however, the world will demand pesticides again making it harder for this bill to pass. Another problem is that, even though pesticides make up a big part of the Colony



Collapse Disorder causes, it is not the only thing that has contributed to it and this makes it harder to control the problem at hand.

Another attempt to reduce the Colony Collapse Disorder was suggested by an environmentalist and was directed to the beekeepers explaining to them that they should not combine a collapsing colony with a healthy colony. This seems fairly straight-forward but farmers usually do the opposite because when a farmer sees that many of the bees in a colony have died leaving only the queen behind with a few larvae, the beekeepers combine them with an already healthy colony so as to save the colony. This makes the problem worse because the bees will contaminate the new hive and cause a collapse there. This process continues until most or all of the colonies have disappeared.

## **POSSIBLE SOLUTIONS**

The biggest factor affecting the Colony Collapse Disorder is clearly pesticides and in particular neonicotinoids which slowly kill the bees and make them unable to function properly resulting in the destruction of their hive. One of the possible solutions for this would be to find alternative methods to use pesticides without harming the bees. By doing so, humans will still get the benefit of using pesticides without the bees being affected by them.

The Colony Collapse Disorder has been going on for decades but it is only until recently that we started to understand what it is. We have discovered how dangerous it is not only for humans, but also animals, and how crucial bees are for our survival. This disorder, being a relatively new one, meant that we must spend more on resources, effort and research into finding out more about the disorder and how it can be prevented.

Another big factor causing the decrease of bee populations are the different insects and parasites that attack their hive as a whole. To increase the number of bees worldwide, a system must be implemented to maintain or even reduce the number of existing Destroyers to prevent further loss of bees.

We as humans are also contributing to the problem of bee deaths when we are destroying their natural habitats to make way for our buildings. When we disturb their colonies, the bees get agitated and abandon their nests, leaving behind a few bees to die, which contributes to the colony collapse disorder. A way to solve this would be to find alternatives in construction and scout the area of construction to make sure that there are no bee hives that would be affected. We can also build in areas that are less surrounded by vegetation and animal habitats to protect the bees. Finding quieter ways to build would also help to increase the number of bees.

## BIBLIOGRAPHY

ARS. "Honey Bee Health and Colony Collapse Disorder." *Department of Agriculture*. USDA Federation, 13 June 2015. Web. 15 July 2015.  
<<http://www.ars.usda.gov/News/docs.htm?docid%3D15572>>.

College. "Combatting Colony Collapse Disorder." *Cenetary College of Louisiana*. Cenetary, 1 Jan. 2014. Web. 15 July 2015.  
<<http://www.centenary.edu/circle/fall2014/bees>>.

Environmental Protection Agency. "Colony Collapse Disorder." *EPA*. United States, 9 Sept. 2014. Web. 15 July 2015. <<http://www2.epa.gov/pollinator-protection/colony-collapse-disorder>>.

EXTension. "Involvement in Colony Collapse Disorder - EXTension." *Pesticides*. EXTension, 1 Jan. 2015. Web. 15 July 2015. <<http://www.extension.org/pages/60318/pesticides-and-their-involvement-in-colony-collapse-disorder#.VaX6r3gQn-Z>>.

IFAS Extension. "Colony Collapse Disorder." *Solutions for Your Life*. University of Florida, 1 Jan. 2012. Web. 15 July 2015.  
<[http://solutionsforyourlife.ufl.edu/hot\\_topics/agriculture/colony\\_collapse\\_disorder.shtml](http://solutionsforyourlife.ufl.edu/hot_topics/agriculture/colony_collapse_disorder.shtml)>.

Margaret Badore. "Bees in Peril: A Timeline." *Bees In Peril - A Timeline*. TreeHugger, 3 July 2013. Web. 15 July 2015. <<http://www.treehugger.com/sustainable-agriculture/bees-peril-timeline.html>>.

Marla Spivak. "What Will Happen If the Bees Disappear?" *CNN*. CNN - UK, 6 Mar. 2015. Web. 15 July 2015. <<http://www.cnn.com/2014/05/17/opinion/spivak-loss-of-bees/>>.

MRL Education Program. "UCSB Science Line." *UCSB Science Line*. National Science Foundation, 1 Jan. 2015. Web. 15 July 2015. <<http://scienceline.ucsb.edu/getkey.php?key=3097>>.

United States. "EPA." *Environmental Protection Agency*. United States, 1 Jan. 2015. Web. 15 July 2015. <<http://www.epa.gov>>.

White Room. "Varroa Destructor: The Enemy within." *Friends of the Honey Bee*. Web Design Warwickshire - BBKA, 1 Jan. 2015. Web. 15 July 2015. <<http://www.friendsofthehoneybee.com/the-problem-the-varroa-destructor/>>.