

Bees – college essay



**ASSIGN
BUSTER**

14 March 2013 Kelsey-Lynne Hills: 10 Kee Biology Essay: " A world without bees: what is causing pollinator declines in the Northern hemisphere and what are the potential implications for South Africa? " The decline of all major pollinators in the Northern Hemisphere, such as bats, butterflies and especially bees are likely to result in negative implications around the globe including South Africa. Bees are the most commonly chosen pollinators around the globe although there are many other capable insects.

As early as the 1900's, colony collapses have occurred and have been documented in the Northern hemisphere. From 1972 there has been a dramatic increase in the number of colony collapses and a very significant decline in the number of maintained colonies. These statistics suggest that an economic downfall may soon take place and there shall be very negative impacts on the biodiversity and food sources if no preventative actions are taken. Bees are vital contributors to pollination. Pollination is the transfer of male pollen to the stigma, which is the female part of the flower, with this fertilization takes place.

This natural ecosystem service is vital for human societies and is the first step in having successful seed and fruit production by a plant. Once a plant has been successfully pollinated and fertilization has taken place, fruit and seeds develop and grow. Bees play an important role of pollinating flowers and plants. It is estimated that one third of Human food supply depends of pollination, most of which is accomplished by bees. Pollinators, such as bees, provide ecosystems and society with food sources such as seed crops, fruit, vegetables and nuts.

The common Honeybee pollinates on average 130 crops alone. If an increase of Colony Collapse disorder continues and we do not take preventative actions soon, then essential food product supplies will decrease and in turn, the price of these products will increase. As an explanation to Colony Collapse Disorder, around the world bees have been disappearing rapidly, in some instances beekeepers have lost 90-95% of their hive. Colony Collapse disorder (CCD) was first noticed in the US whereby entire bee colonies simply died out with unexplainable circumstances.

In the winter of 2006/2007 alone, US lost approximately more than a quarter of their 2, 4 million bee colonies, accounting to tens of billions of bees died out due to CCD. This loss resulted in an 8 to 12 Billion dollar effect on US agricultural economy. These current events in pollinator decline indicate that a sixth major extinction of biological diversity will soon take place. Many different reasons for this pollinator decline have been put forward but none have been proven to be a definite cause.

Some have been proven to be contributory factors, such as insecticides, pesticides, genetically modified crops, disease, loss/destruction of habitat, pollution and over-harvesting. It is strongly believed that the primary contributor to this significant decline in bee colonies around the globe is a result of the wide spread use of pesticides and insecticides. These insecticides, used as commercial agrochemicals, go through very thorough testing procedures to ensure that they will not cause a harmful effect on the environment.

However the information that these safety assessments reveal more often than not originate from the very companies that manufacture and sell these chemicals. For years various companies have been reporting that their products are perfectly safe for use in flowers that rely on bee pollination, and claim that their products would have no harmful effect on bee colonies. Independent scientists have published their research and are in common agreement that the results suggest otherwise.

It has been identified that the main insecticide/pesticide called “Neonicotinoids”, a concoction of various chemical products, used by various large corporate manufacturers and is a chemical that has been among the most widely used pesticide because of its supposedly harmless effect. Countries including South Africa are amongst their many users. Another theory that contributes to the to the increase of Colony collapse Disorder and pollinator decline is the fact that there are more Genetically Modified Organisms (GMO), simply bees love pollen and the theory is that these modified pollens are detrimental to creatures such as bees. New Genetically Modified crops have now been designed to be immune to any pesticides or insecticides, this resulting in an increase in the usage of these chemicals. Genetic modification of a plant in turn leads to the genetic modification of that flowers pollen, when this pollen becomes genetically modified, the bees then go malnourished because there are no longer enough nutrients in the modified pollen for the bees to feed off.

Bees then die of illness due to the lack of nutrients and die of diseases, mostly in the digestive system, due to hard material, in the digestive tract system, that has been ingested from Genetically Modified pollen. It has been

proven that if a bee visits Genetically Modified Organisms, that bee will have severe digestive problems and this can result in death. As well as these GMO's, disease is also a proposed problem within the bee colonies, there are certain mites that are known to spread disease amongst the bee population.

Although this is a major concern and contributory factor of colony decline, many beekeepers have pointed out that due to the rapid decline in bee colonies, this cannot be targeted as the main cause. With regards to Horticulture, pollinator decline causes many potential implications.

Horticulture and many garden plants need the process of pollination and if they do not receive this pollination they will no longer produce seeds or fruit. However, the public can help by not using detrimental pesticides/insecticides and can plant flowers that bees like and are attracted to.

Humans benefit from the relationship between plants and bees because as a result, this mutualism produces a variety of fruits and vegetables that are vital for our survival. When you walk into a grocery store there is a wide variety of fruits and vegetables to choose from that have benefitted from the relationship between these two organisms. Without the help of bees you would not see the vast varieties of fruit, such as apples, that are available in South Africa, for example, Golden Delicious, Granny Smith, Pink Lady and Royal Gala are a few of many different types of apples that are available on our stores and are always in constant supply.

This constant supply of fresh produce is achieved by bees. When a Honeybee finds an apple tree that is in flower, the bee will remain on the same tree in order to collect as much nectar and pollen as possible. It has been

discovered that cross-pollination occurs when bees move from one tree to another. If some of the Honeybees in a hive are visiting a certain variety apple tree and others are visiting a different variety, there is a good chance that both types of pollen will be on the bodies of most of the bees in the hive.

Cross-pollination can occur when a honeybee has obtained pollen on its body from another bee visiting a different variety of apple tree flower, for example when a honeybee that has Red Delicious pollen on its body, which it obtained from other bees in the hive, is visiting Granny Smith apple flowers, the Red Delicious pollen will be deposited on the first few of the Granny Smith flowers visited and those flowers will have a good chance of becoming apples. Pollen must be transferred from one flower to another to ensure that the plant will produce fruit and seeds so that new plants can be produced.

This shows how bees and plants benefit from each other and how as a result of their mutualism, plants can mature and grow. As a result of this pollinator decline, there are very harmful implications on the countries agriculture. Although food resources that are in the grass family are pollinated by the breezes and do not require insect pollination, most root or above ground crops rely on pollination to mature and can only be harvested once they have been through the process of pollination.

If this process were to disappear, by pollinator decline, these plants would not be able to grow and produce fruit, vegetables, nuts or seeds, therefore this decline of bees will result in the decline of worthy agriculture and will put an end to the countries constant supply of fresh produce. It is imperative to

have this supply of fresh produce as one gain nutrients and minerals that are essential for survival. This will be a national and global effect.

Another distressing fact is that the crop production industry in the Western Cape relies on approximately 90% of the total number of managed colonies to provide the pollination that is required to produce enough crops that are on demand. This means that in order to receive the most essential food sources, society relies on a large number of pollinated fruits and vegetables, which in turn indicates that the food we put into our mouths daily relies on a large number of bees doing their job. In addition to agricultural effects of pollinator decline, this decline also has many implications on South African Economy.

Since the late 18th century the Western Cape region in South Africa has been famous for its wine, brandy and fruits and exports, these products around the globe. With over 100ha of cultivated vines, the Western Cape region has been labelled the ninth largest exporter of wine in the world and is also well known for its fruit and fruit related products. Ceres fruit juice originated in the town of Ceres in the Western Cape and is now a major exporter of fruit juices around the globe and especially to North America, Europe and Asia.

In addition to Ceres fruit juices, Appletiser, a popular sparkling fruit juice sold nation and global wide, originated from all production is based in the town of Elign in Western Cape. This shows that still dominating exporting industries in the Western Cape, with just over 47% of all products being exported being agricultural products. South Africa's largest export markets continue to be

European countries. This agricultural exporting industry produces income of roughly 21.5 million Rands annually which in turn provides many South Africans with employment and steady income.

Pollinators are the sole providers for this income and are vital in order for fruit trees and vineyards to develop and grow because without pollination there would be a major agricultural as well as an economical loss that would put our food resources in short supply and leave many South Africans unemployed. A world without bees would have a catastrophic impact on the world as we know it today. Without these vital pollinators, agriculture, biodiversity and the world's agricultural economy would cease to exist.

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