

Disposed Paper Cups Towards Decline of Bee's Colony

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ABSTRACT

Colony collapse disorder (CCD) was reported as a major cause for decline in bee population and subsequent agricultural productivity from many parts of the world. Many biological and physical factors such as diseases namely, insecticides, environmental stresses or a combination of all these are attributed as reasons for bee collapse. However, clear cut facts on bee collapse are not reported recently. The change in lifestyle pattern and increased awareness on environment have enhanced the usage of disposable paper cups rather than glass, plastic cups invariably in coffee shops, juice centres in urban, semi-urban, rural and biodiversity protected areas. The bees neglect visiting flowers are attracted by the rich residual sugar in the cups as an alternative food resource. A Considerable population of honey bees are visited to these 'cup flowers' never returned to the bee hives. These cups act as 'death traps' for them. This has been observed for a period of 35 days since 1st Sep 2023. The number of cups in these bars ranges 160 to 4000 approximately with an average of 1225 cups in a day. The bees fell into the cups containing the residual beverages and were unable to fly. This leads to the death of the bees. We recorded adult dead bees in the coffee bars in 35 days.

Keywords : Colony Collapse Disorder, Coffee Shops, Juice Centres

I. INTRODUCTION

The disposed cups towards decline of bee colony. Initially, colony collapse disorder was reported as a major cause for decline in the bee's population and subsequent agricultural productivity from many parts of the world. Many biological and physical factors like insecticides, pesticides and other diseases are attributed as reasons for bee colony collapse. However, clear cut facts have not been reported recently so far.

The change in lifestyle pattern increased awareness on environment has enhanced the usage of disposables paper cups rather than glass, plastic cups invariably in coffee shops and juice Centres in urban, semi-urban, rural and biodiversity protected areas. The bees neglect visiting flowers are attracted by rich residual sugar in the cups as well as an alternative food resource. A considerable population of honey bees are visited to these cup flowers never returned to bee's hives. This what makes them to the death of

bees. We are here to report qualitative and quantitative data on subsequent loss of adult worker bee population.

The disposal of paper cups can contribute to environmental issues that indirectly impact the bee's colonies. While paper cups themselves may not directly affect bees, their improper disposal can lead to environmental pollution. When paper cups are thrown away and end up in landfills, they contribute to the overall waste burden. Landfills generate methane, a greenhouse gas that contributes to climate change, which can affect bee's habitats and ecosystems. Moreover, the manufacturing process of paper cups requires resources such as trees, water, and energy. Deforestation for paper production can reduce natural habitats for bees and other wildlife, disrupting ecosystems and potentially reducing available forage and nesting sites for bees.

The decline in bee colonies can also be attributed to habitat loss, pesticide use, climate change, diseases, and other factors. While the impact of disposable paper cups on bee colonies might be relatively small compared to other factors, their contribution to environmental degradation does play a role in the broader context of ecological imbalance, which affects bees and other pollinators indirectly. To support bee's populations and mitigate environmental harm:

- **Reduce, Reuse, recycle:** Minimize the use of disposable products like paper cups. Opt for reusable alternatives or choose biodegradable or compostable options when available.
- **Proper Disposal:** If using disposable paper cups, ensure they are disposed of properly through recycling or composting where facilities exist.
- **Support Bee-Friendly Practices:** Plant bee-friendly flowers and avoid using harmful pesticides in gardens to create a conducive environment for bees.

- **Advocate for Sustainable Practices:** Encourage businesses and policymakers to adopt eco-friendly and sustainable practices that reduce waste and promote habitat preservation.

Addressing the decline in bee populations requires a holistic approach, considering multiple factors contributing to their decline and taking concerted efforts to mitigate these issues.

AIM AND OBJECTIVE:

Our aim is to determine the change in lifestyle pattern of the bees in response to Bees Colonies Collapse Disorder (BCCD). In increased awareness on environment enhanced the usage of disposable cup instead of plastic cups in coffee shops and juice centres in urban, semi-urban and rural areas. The sugary residue attracts the honey bees to visit the disposed cups. Bees neglect visiting the flowers are attracted to the sugar in disposed cups as an alternative food source. It is a considerable one and acts as death traps for them.

HYPOTHESIS:

It is our responsibility to keep the environment safe, clean and disposable of plastic cups to conserve ecosystem and biodiversity. Bees are very important for 75% of pollination. So, it is to be protected for future generation uses [food productivity]. So, they can live the life naturally and do the same. This project will reduce the attraction of bees towards sugar residual in tea cups. This project will help us to know about our ecosystem, understanding ecosystem for health and well-being. After completing the forage flight, bees carry pollens, they are in search of energy to continue their flight. Then some bees are in search of direct Nectar towards the flowers. Then these are the reasons that bees are attracted to cup-flowers for the bees. (Disposed Paper Cups).

NEED AND STATEMENT:

We all deserve to live in this world just like these insects and other species deserve to live in this world and our research will be very helpful for future generations and we can bring the bee species back to their former state. So that, we can provide food systems for future generations like eco system and biodiversity conservation can be made.

It is important and urgent to protecting bees from us. As a result, obtained, bees visit 100 flowers per foraging flight compared to 40 flights per day. With a maximum of flight compared to 40 flights take off per day. Bees are attracted to sugar residual on disposed paper cups. It leads to collapse in bee’s colony and leads to decline in its population. If no actions taken longer, it will have a severe impact on ecosystem, leads to food scarcity, hunger and malnutrition.

II. METHODOLOGY

Our plan of action includes the data of number of disposed paper cups accumulated in a shop at the same time number of bees died by stroking in gelatinous sugar residue. We gathered and analyses main factors involved in the attraction of bees towards paper cups and we found out that ‘POLYPHENOL’ was the compound which attracts the bees towards the cups. The analysed data is evaluated below.

III. DATA COLLECTION

By visiting 145 shops in 12 areas on both rural and urban areas in and around Pondicherry we observed that the number of disposed cups in the shop ranges from 240-5000 with the average of 1225 cups per day. The bees fell into the cups containing residual beverage [coffee, milk, tea and were unable to fly. It leads to the death of the bees and we recorded dead bees in the cups. That means death rate varies with the depth of the waste bin with cups, quantity of

residual beverages, location of the sampled bars and visiting time. Maximum mortality (23%) was recorded between 10:00 and 14:00 hrs in the cups with 3–6 ml beverage remains found at a depth of 20–40 cm in waste bins.

The bees trapped at the bottom (60 cm) of the bin at most successfully escaped to the middle zone only. Later the cups are sent to the recycling yard, where about 680 bees/day are killed manually in order to escape stinging. Our observation also revealed that bees need large quantities (~ 72 cups) of sugar-coated cups and longer duration (30-35 days) of display to select new coffee bars as foraging sites. But once visited, they continue to do so regularly.

We identified that pollen grains are present in the feet of the dead bees and we identified the type of pollen grains with the help of technique called staining technique.

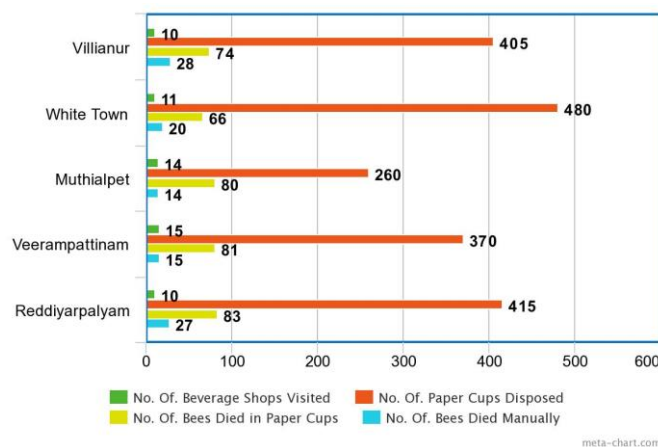


Figure 1: Data Collection

From the above graph we can understand a clear data analysis of our survey briefly. Our survey includes the number of places we visited and calculated number of disposed cups, number of bees died in sticky residual on disposed cups and also the number of bees died manually by recycling, data which was given by SWATCH BHARAT CORPORATION. It is inferred that the number of bees with respect to number of tea shops increases in an exponential way.

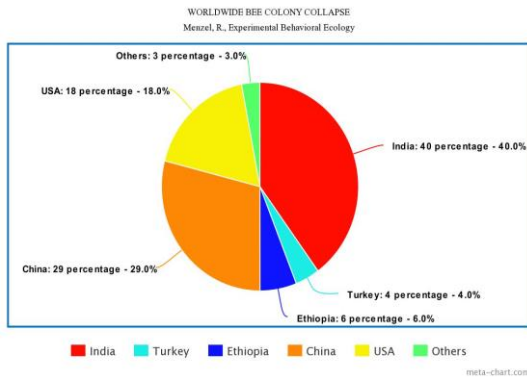


Figure 2: Worldwide Bee Colony Collapse

This pie chart gives us a clear data analysis, of decline of bee colony in every country. It includes the countries namely India and USA etc.

The percentage of bees died due to these Bee Colony Collapse of all countries have been mentioned clearly. This data has been analysed from the reports made by surveyors from the different parts of the world. Many developing countries like India ranks top in the decline of adult worker bee colony population. From our pie chart, we concluded that bee colony collapse had spread worldwide.

From the above given pie chart representing bee colony collapse in India towards disposed paper cups, we can clearly see that India has a considerable amount of death of honey bees when compared to other countries in the world. It is due

to the presence of huge number of tea shops, coffee shops, juice centres and beverage shops in India when compared to other countries of the world.

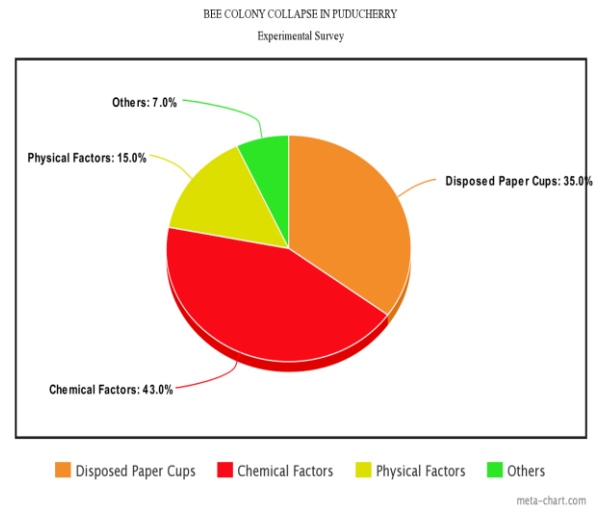


Figure 3: Bee Colony Collapse in Puducherry

From the above graph, we can see that how the decline of bee colony in disposed paper cups have grown throughout the year clearly and how bad it affects the bees. It contains data not only number of bees died in paper cups but also in chemical and physical factors like manual cleaning, insecticides, pesticides and other factors contributed to bee colony collapse disorder.

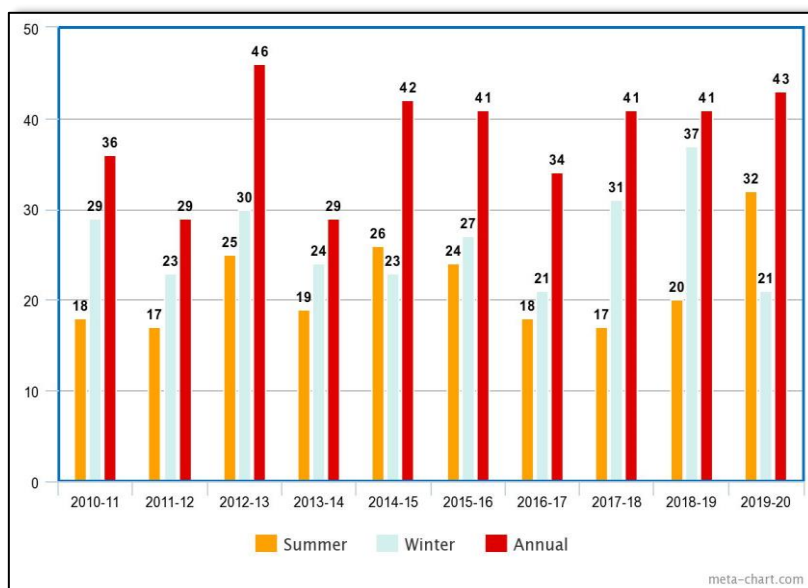


Figure 4: Decline of Bee Colony from 2011 to 2020

From the above graph, we can see that how the decline of bee colony in has grown throughout the Different years which ranges from 2011 to 2020. From the representation we can reduce the number of bees died in a particular interval of time. Not only this but also the number of bees died in a particular season.

We came to know that a greater number of bees have been died in winter season. It is due to the temperature is very low, so the bees are searching for the warm temperature. The disposed paper cups containing hot residual beverages could give the warm temperature. Later its wings get stuck into it and it became immovable and was unable to fly. It leads to death of large number of honey bees and results in bee colony collapse disorder in winter season.

DATA ANALYSIS:

Once we recorded our observations, we had made a data table which includes the number of tea shops in an area, number of paper cups disposed, number of bees died and to calculate the majority of the species destroyed. The information is tabulated below:

Table 1: Data Analysis

S.NO	DAYS	NO.OF BEVERAGE SHOPS VISITED	NO. OF PAPER CUPS DISPOSED	NO. OF BEES DIED IN CUPS	BEES DIED MANUALLY	NAME OF THE BEE SPECIES DIED
1	1-3	12	370	60	25	Apis indica
2	4-6	10	405	74	28	Apis mellifera
3	7-9	12	215	60	17	Apis dorsata
4	10-12	11	310	62	20	Apis indica
5	13-15	13	340	69	11	Apis flora
6	16-18	14	260	80	14	Apis mellifera
7	19-21	15	370	81	15	Apis dorsata
8	22-24	11	480	66	20	Apis indica
9	25-27	13	410	74	23	Apis mellifera
10	28-30	11	370	73	24	Apis laboriosa
11	31-33	13	390	60	26	Apis indica
12	34-35	10	415	83	27	Apis mellifera
		145	4335	842	250	

We noted some shops constantly and we have observed and calculated how many bees were died by man-made and natural factors. This data helps us to identify the major decline and imbalance in the ecosystem.

From this data Table we concluded that large number of bee species have been died in urban areas when compared to rural areas. This is due to rapid number of Beverage shops have been situated in urban areas when compared to rural areas.

From our survey, we determined the name of the bee species in and around Pondicherry. The source of the data derived from the book "Native Bees and Pollination" written by Ammel Sharon.

Table 2: Latin Name and English Name of Bees

Latin name	English name
Apis dorsata	Rock bee
Apis flora	Dwarf bee
Apis cerana indica	Indian honeybee
Tetragonula iridipennis	Stingless bee
Trigona iridipennis	Stingless bee

DATA INTERPRETATION:

ON DISPOSING PAPER CUPS IMPROPERLY:

When paper cups are not disposed properly in garbage bin, it leads adverse effects on environment. It leads to destroy ecosystem and does not maintain sustainable environment. The bees are struck in the gelatinous sugar residual and later lead to death by naturally or artificially. It leads to major decline of bee colony and subsequent loss of their population.

ON DISPOSING PAPER CUPS PROPERLY:

When this project is implemented, tea cups are disposed properly once after single use in garbage bin which are maintained properly. It conserves our ecosystem and maintain sustainable environment. We can use silverware or glassware, which can be washed once after single use. It does not lead any bees to attract on deposited sugar residual and does not lead to be colony collapse. By using this technique, we can conserve ecosystem with eco-friendly approach. It leads to increase in pollination by bees on plants. It will prevent bees from becoming endangered species.

RESULT

As an aftermath of what we did, we found the increasing trend in urbanization and subsequent increase in beverage bars may aggravate the mortality of bees that inhabit in and around urban and semi-urban ecosystems. There are about 1.3 billion to 800 million cups of coffee and tea consumed daily around the world by using millions of disposable cups. We have concluded that the species called "*mellifera*" was the species that has been mostly killed. We recorded tea cups shops and the number of dead bees. As the major decline in the bee colony due to the attraction of sugar residues will make the bees into an endangered species and to drastic change in ecosystem. Our idea is to get rid of these major changes in ecosystem and to make into a friendly and sustainable environment and ecosystem.

IV. CONCLUSION

Loss of pollinators could lead to lower availability of Food crops and wild plants that provide essential micro-nutrients for human diets, impacting health and nutritional security and risking increased numbers of people suffering from vitamin A, iron and foliate deficiency. Bee populations have been declining globally over recent decades due to enhanced usage of disposed paper cups. The main aim of this project is to create awareness among the people about the death of the nature's best

pollinators. We have to find a way to stop the decline of the bee colony collapse. Even though bee collapse has been recorded in many countries in the past, there is no scientific data and even awareness on this issue in developing countries like India. What we observed could be one way of bee colony collapse in India. It's hard to say because we don't have sufficient studies to make a definite claim about a crisis of pollinator decline. Nevertheless, farmers have observed a significant decline in numbers of wild pollinators and, in some parts of the world, a decline in domestic bees. There is considerable worry in India.

Findings:

- Paper cups to be disposed properly once after a single use.
- Create an awareness among the people about the declining population of bees by paper cups.
- All beverage shops have been advised to have trashcans or dustbins are maintained in a hygienic way.
- We should encourage the use of silverware instead of paper cups to ensure the safety of pollinators.

V. FUTURE PLANS

Our next plan is to study a particular environment and the changes and effects aroused due to man-made activities. By saving the bee species through this thesis, we will not have a crisis of food and food related products in the future and by making the public and students aware of the destruction of these bee species, we will safely dispose of the tea cups we use in public places and cover the garbage bins and protect these bee species by planting more plants here and there. It is our full duty. Protecting these bee species will be very beneficial for us in the ecosystem and biodiversity conservation.

We never use Fire to kill bees. Because bees are like Human beings. We have to care bee's hums like we care for our children. Bees also give birth

like us, that is why no one in our community should kill bees.

**“SAVE THE BEES FOR THE WELFARE
OF MANKIND”**

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