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Decline in Honey Bee population in Southern India: Role of disposable paper cups

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ABSTRACT

Pollinating insects play an important role in forest and agro-ecosystem. Unfortunately, in the recent decades, nectarivorous bee populations have been declining at an alarming rate. That keeps the crop and wild plants at bay. Abandoned disposable cups in southern India have reportedly caused a significant decline in honey bee population which is likely to impact on the biodiversity and agriculture productivity of this region. The present research effort demonstrates that using closed dustbins and managing their frequent cleaning are effective solutions.

Keywords: Dammar bee, paper cup, nectarivorous, Southern India

INTRODUCTION

Insects play a key role in nearly all ecosystems considering that it is a primary group interlaced with several ecological functions of forest and agro-ecosystems. One of their chief functions is that of pollination. Globally, 70% crop plants and 98% trees in lowland tropical rain forests are pollinated by insects [1-2]. For instance, in the Western Ghats of southern India, apid bees alone contributed to the pollination of 18% of 86 species of trees, and 22% of the shrubs [3,4]. Ironically, the recent decades have witnessed an alarming decline in the population of insect pollinators, especially nectarivorous bees are declining in an alarming rate that keeps the crop and wild plants at bay. This may turn out to be a mammoth challenge to global food production in the near future [2, 5, 6].

Studies from the tropical region disclose that there is a decline in the density and diversity of insect pollinators in human-dominated landscapes. This is especially true for the nectarivorous bees with their population declining in an unprecedented manner in disturbed forests and other man-dominated areas like agriculture landscape [7]. Many biological and physical factors such as climate change, habitat destruction, diseases, insecticides, environmental stresses, and change in lifestyle pattern or a combination of all these may be attributed as reasons for the decline and demise of nectarivorous bees. However, clear-cut facts/factors behind this phenomenon are yet to be ascertained [8-10].

Chandrasekaran *et al.* [8] reported that increased awareness regarding environment phased out the glass cups and other metal cups from tea and coffee stalls in several areas of the state Tamilnadu, India. The usage of disposable paper cups invariably in coffee/tea shops and juice stalls in urban, semi-urban, rural and eco-tourism spots and protected areas in Tamilnadu is fairly common. The sugary residue left behind in the abandoned beverage cups attracts the honey bees on a large scale. Instead of visiting the natural flowers, the bees are attracted more by the sugary rich residue in the cups and use it as an alternative food resource. Ironically, considerable populations of honey bees that visit these artificial cup flowers never return to their hives. These cups act as 'death traps' for the bees as they fall into the cups and get enmeshed in the syrupy residues, thereby becoming unable to fly out. This

causes large-scale mortality and a cataclysmic population decline of honey bees. Remarkably, the study reported the death of nearly 168 bees/day from a single shop and confirmed 25,211 dead bees in the coffee bars in their study area within 30 days.

Along similar lines, we found the dammar or stingless bee, *Melipona irridipennis* (Meliporidae) one of the important pollinators, also get attracted by disposable cups. Within ten minutes of observation, nearly 48 bees were found to have lost their lives in a single cup. Also, more than 800 bees were disposed of in a single dustbin before a tea shop in the same day (8^{hr} observation) (Figure 1). If the same trend extends for a few more days or weeks the worker bees in entire colony will lose their lives. We presume that this kind of modernization is culpable, and it is one of the local reasons for the loss of bee colonies.

The honey and wax produced by the dammar bees play an important role in the livelihood of poorer forest dwelling communities in the Nilgiri Biosphere Reserve (NBR) in India where 15 local ethnic groups harvest honey as a source of revenue [11].

In general, the loss of nectarivorous bees would result in the significant plummeting of forest and agro-biodiversity, resulting in skyrocketing of food prices. Moreover, many floral species are dependent on honey bees for pollination and many local communities also depend on honey and wax as a source of livelihood [12]. Hence, the immediate ban or safer way of disposing of the cups is needed. Using close-type dustbins, frequent and periodical cleaning of the bins and the tabletops will help prevent the large-scale mortality of bees. Moreover, awareness program should be conducted about the enormous loss of bees due to open disposable cups. Concomitant effects of honeybee loss are provided in figure 2.

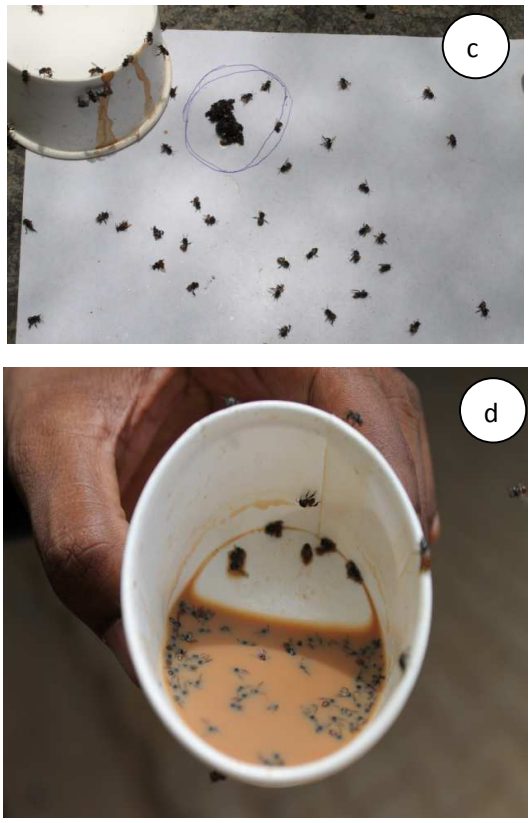

Figure 1. a, dustbin containing numerous disposable cups with live and dead bees. b, a cup contains numerous bees. c, mass mortality of bees collected from a cup. d, dead bees within ten minutes observation.

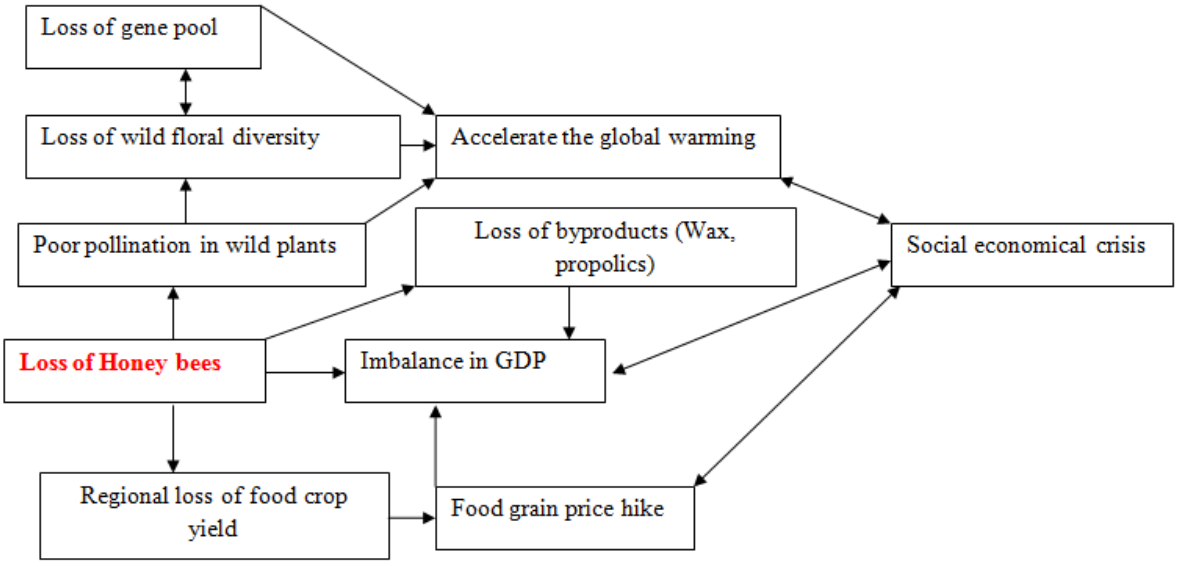

Figure 2. Schematic diagram showing concomitant effects of honey bee loss

→ Indicating the unidirectional ↔ Indicating *Vice Versa*

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