

## Studies on Impact of Insecticides to Indian Honey Bee, *Apis Cerana Indica*, Fab (Apidae: Hymenoptera) A Survey

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### Abstract

Insecticides use, considered as one of the common practice in local farming system, cause detrimental effect on agriculture environment and bio diversity subject. (celli *et al* 2003)<sup>3</sup> Besides that residue sprays on pesticides could also make unintended possible effect to honey bee and other Pollinators. (Stokstad, 2007)<sup>5</sup> So, pollinators have great impact on plant productivity. Because of this main issue to keep the pollinators in healthy and high diversity for sustainable of environment, food and environment. (Celli *et al*, (2003)<sup>3</sup>, (Neumann, *et al*, 1994).<sup>55</sup>, The field observation a recorded in agriculture crops and laboratory test recorded the effect of common insecticides to mortality and behaviour of honey bees. 96% pesticides traded were applying by our farmers, besides there were 13 active ingredients of fungicides 15, insecticides and 1 herbicides, 1 Molluscicide, they are using twice a week during crop cultivation; 60% of farmers mentioned the presence of honey bees on their land Farmers knowledge in use of insecticides (sethuraj, 2004)<sup>10</sup> is appropriate and safe for bees and farmers when applying insecticides in their field, forager bee move to flowers as the preference (Allen *et al* 1998)<sup>4</sup> to insecticides was 12.5% and 0%, 4.2% mortality test showed LD 50 value O. O1√g/√l insecticides rate is 0.031 and 0.09, which much lower than suggested dosage recommended by insecticides producer. (Said *et al* 2013).<sup>78</sup> This research concludes, that the use of insecticides could lower the pollination service.

**Keywords:** *Apis cerana indica*; Behavior; Insecticides pollen; Pollinator; Preference; Lethal dose.

## INTRODUCTION

Pesticides including herbicides, insecticides and fungicides are commonly used to prevent or

damage pests (Velthuis, 2016)<sup>20</sup>, such as weeds, insects and plants pathogens while reducing the amount of labour (Beekman *et al*, 2010)<sup>7</sup>, Winston, 1991) 60 fuel and machinery used for pest control. Bees had been considered as the preminent and economically most important groups with 35% of the world food crops production depends on pollinators by honey bees and more group of insects (Sigh, 1943) 73 (Van Engeldrop, 2010).<sup>19</sup> In Europe animal pollination could influence the production of 84% of crop species, like honey bees also important pollinators service to wild plants, while they also provide human society by producing various products, honey bees (pests, pathogens, chemical pesticides) (Potts *et al*, 2010) 76 (Haynes 1988)<sup>8</sup> GM crops resource availability habitat fragmentation).

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Therefore it is necessary to maintain the pollinators especially in areas that have large farming field of pollinators depends crops such as mango melon, pumpkin, chilli coconut, carrot, Prini Jal, cabbage, Cauliflower, soya beans, chilly, (Beekman *et al*, 2010)<sup>9</sup>

There are atleast 5 common honey bee species *Apis Anderiformis*, *Apis dorsata*, *Apis florea*, *Apis nigracincta*, *Apis cerana indica*, *Apis Mellifera*. Among them *Apis cerana indica* is common bees kept by local bee farmers and usually located near agriculture area (Alkinson, 2005)<sup>56</sup>, Kubik, 1999)<sup>51</sup>, Challa *et al* 2019).<sup>54</sup>

Many agriculture countries the usage of pesticides is common practice is save around 1/5 of total production from pest attack. However in order to create an insurance feeling, the local farmers usually applied higher dosage than recommended dosage. This condition create greater ti honey bee colonies as they were under costant insecticides exposure that may alter (deleterious) behavior and health of colonies, this research consist of couple of parts 1) field observation about Vistiation rate of honey bees to crops and wild plants 2) Laboratory Test to find the impact of insecticides to direct bee mortality and there behavior.

## MATERIALS AND METHODS

This study was divided in to different steps as follows, Preliminary survey; to determine representative location of study, area maruthamalai Lord murga temple hill aera, and also in an around village area coimbatore, Tamilnadu, South India.

Interview of pesticides use the activity was performed to access pesticides use by farmers. The materials used were as follows GPS, Global positioning system, questionnaire, cameras, stationary and other tools Data were collected and then descriptive analysis was performed (Celli *et al*, 2003)

Sampling area and field observation; Field observation was conducted during active period of honey bee 08; 00 to 15; 00AM, the observation and recorded number of bees visitation and plant species were recorded, the activity was carried out for 30 days (Feb 01 to March 03-04- 2023). In order to find type of pollen collected by forager of honey bee, returning forager and kept them inside vial with alcohol 70%, pollen collected and measured by Haemacytometer with formula (AAAS, 2013).<sup>81</sup>

$$\text{Pollen} = \Sigma A B C D \times 2500 \times \text{df}$$

ABCD = Number of pollen inside four counting chambers

df = dilution factor (in the research dilution factor was calculated was 2)

## Survey of Pesticides use

Data regarding on pesticides use was obtained by interview ing the farmers directly in the field, (Frazier, *et al*, 2008)<sup>86</sup> Data collected were education background, crop they cultivated pesticides application types of pesticides dose, application, intervals knowledge of farmers related pesticides and farmers perception regarding on the presence of honey bee in the field.

## Toxicology and Behavior Test; Relationship with Data Analysis

900 nine hundred Forager Bees were kept in side the bee cub created from plastic cub (lid diameter 8.2 CM bottom diameter 5.8 CM and heights 12 CM during laboratory test, each cub hold 20bees, they feed with 80% of honey and all container kept inside room with average daily temperature 25 C degree temperatures, humidity 60- 80% and photoperiod 12; 12. Like three different types of insecticides were used in this test Active Ingredient 50g/l, active ingredient Profenofos 500g/l : active ingredient Chorotanolprol 100g/l and cyhalotrin 50 g/l. The purpose of the study to find LD50 Of each insecticides to honey bees : also applied bee by microsyringe while adequate applied to throax of control group of honey bees, followed that number of mortality was observed each for 24 hours (feal *et al*, 2011)<sup>94</sup>

## Behavioural Test

Impacts of insecticides to behaviour of foragers bees standard Y tube used in this test. Each test used visted cornflower applied with and without insecticides rate was measured (winfree, *et al*, 2007)<sup>98</sup>

**Data Analysis** Was measured by probit analysis using computer programming POLO PC. Difference among data was tested by t-test with confidence value P value is  $P < 0.05$

## RESULT AND DISCUSSION

During this study we found that honey bees visted various types of flowers around hive including agriculture crops, plants of resident garden, wild plants, and forest plants (Babacan, 2007)<sup>14</sup> However observation on crops plants showed honey bees

prefer some species than others such as *zea mays*, *capsicum frutescens* and *cucumis sativus* of crop play (Currie, 1999)<sup>15</sup> Based on results on preference of honey bees to crops found that even though bees shows less restrictions, (Al zan *et al*, 2009)<sup>101</sup> this study found that all of most preference plants are located near agricultural field. Also, this research found during dry season that caused great stress as the food and water resources dwindling (Al walli 2004)<sup>13</sup>, colony which lead to absconding behaviour response when all colony members for better nest, due to Availability of nectar while crops plants only provide pollen as reward for honey bees (Gouldin *et al*. 2008).<sup>18</sup> Nectar is important resources to maintain energy storage in the nest as they change in to honey stock. (Damalaas, 2009).<sup>100</sup>

### ***Farmers Perception for the Presence of Honey Bees in the Field***

The results of the interview, showed that 60% of farmers said that the presence of honey bees on their field was abundance (Al Naggar, *et al*)<sup>12</sup>, zolalancloumn, 2016)<sup>50</sup> as general information about honey bees from interview showed that *Apis cerana indica* was more plenty than *Apis Mellifera*, and *Apis dorsata*. It is likely that land covered by large forestry area had much honey bee population. (Willam, 1994)<sup>2</sup>, Robinson, 2000)<sup>31</sup>, Holy, 2013).<sup>34</sup> During rainy season honey bees were much easier found in the field (Goulson, 2008)<sup>29</sup>, while during the during the dry season they could be found also in many agriculture crops (Dinter, 1971)<sup>45</sup>, when it rain honey bees will stops foraging and will only stay in the hive, (Evan *et al*,2018)<sup>16</sup> but in the dry season they will gather water to keep he colony cool (pokhrel, *et al*,)<sup>11</sup>

### **CONCLUSION**

We conculde that, the safest compound, honey bee APIs *cerana indica*, insecticides acetamiprid, mostly suggested for use in crop blooms during insect infestation (cox-Foster 2009)<sup>25</sup> without impacting honey bees. Pesticides are ingested not only by the forager (Alphey, 2002)<sup>35</sup> (honey bees) but also hive bees / larvae who feed on nectar and pollen held in honey comb, as a result pesticides impact /effect cause affect the various levels of honey bee (mklein,2007).<sup>1</sup>

Wide variety of pesticides such as insecticides, herbivores, fungicides as well mixed formulation of fungicides and insecticides (Sethuraj, 2004)<sup>10</sup>, yang *et al*, 2008).<sup>39</sup> The majority of respondent reported

that they usually apply herbicides insecticides and fungicides at least twice during crop season. (Lawrence *et al*, 2007)<sup>21</sup>, xaiver, 2020)<sup>42</sup> Al though some farmers may be aware of pesticides hazards but adequate protection is hardly taken minimize risks., (le conte; 2008)<sup>23</sup> further confirmation on abundance and diversity of pollination using most insecticides applied that found from this survey should be performed.

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