



## EFFECTIVENESS OF BEEHIVE FENCES TO DETER CROP RAIDING ELEPHANTS IN KERALA, INDIA

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### ABSTRACT

*Human-elephant (HEC) conflict is a growing concern in today's crowded world. This study was initiated to check the effectiveness beehive fence an eco-friendly, low cost biological fence against crop raiding Asian elephants (*Elephas maximus*). The usual elephant pathways in to the crop fields of the forest fringe area at Mayilumpara under Karulai forest range Malappuram District were blocked randomly by using twenty beehive boxes from March 2014 to December 2014. Within fourteen encounters recorded, only two occasions the elephant successfully entered in to the crop field by breaking the fence which intern shows the drastic decrease in the rate of elephant encounters in the presence of fence. Fifteen kilograms of honey was extracted from the twenty beehive boxes in the experimental site. It is a good short term low cost control measure against Asian elephant.*

**Key words:** HEC, beehive fence, low cost, honey, elephant encounters.

### **Introduction**

Human- Elephant Conflict (HEC) is a recurring problem that appears where ever the range of elephants (*Elephas maximus*) and humans overlap. With the expansion of human population, natural forest is shrinking rapidly which is leading to increasing incidents of HEC. The intrusion of elephants into human habitation is not something new. The main reason for this is habitat fragmentation and loss of elephant corridors due to unsustainable developmental activities. Elephants come in conflict with people by destroying crops, causing human casualties

and even killing the people and this creates considerable apathy among the people living on the periphery of the Reserve Forest and is deterrent to conservation efforts (Sukumar, 1991). In India, traditional, cultural and religious attitudes towards wild animals make local people tolerant towards wildlife, despite the damage to crops and livestock (Imam *et al.*, 2002). Besides these the fear of wildlife laws keeps people away from the revengeful approach against wildlife. But the situation may become worst in near future so, it is better to evolve new cost effective low cost mitigation measures to keep wildlife in their territory. Even though constructing trenches and electrical fences are effective against the elephants the cost and maintenance is a problem. Nath & sukumar (1998) found private and company owned fences to be moderate to highly effective, and Government owned fences less effective in Karnataka. They found 84% of privately owned fences were operational as compared to the 17% of State Forest Department Fences. A Rocha, India (2006) inspected a 10 km length of trench in Bennerghatta National park in Karnataka, India and found 882 failure points. Efficacy of chilli-tobacco rope as a deterrent was significantly better in the low-rain fall region relative to medium and high-rainfall region (Chelliah *et al.*, 2010). If the scientific community wants any success in improving the people's attitude and perception towards elephant, then it is inevitable to offer practical and low-cost solutions to farmer-elephant conflicts and in this contest comes the importance of Bee-hive fence as a viable contribution to the toolbox of options for reducing conflict for the small scale farmers. Beehive fencing is an innovative mitigation measure used against crop raiding elephants which is effectively tested in African countries. The African bee *Apis mellifera scutellata* is selected for making the fence which is more aggressive and venomous than the other bee species and is a subspecies of the Western honey bee. It can respond more quickly when disturbed. So the first challenge we have to face in the field test of beehive fence experiment at Kerala is concerned with the replacement of *scutellata* with the Asian bee *Apis cerana* which is less aggressive in nature but commonly used here for apiculture.

## Study area

Karulai Forest Range of Malappuram District in Kerala State spanning an area of about 26560.76 ha notified under New Amarambalam Reserve and Karulai Reserve was selected as study area. Karulai Range comprises of evergreen forest only. Mayilumpara (N11<sup>0</sup>16'19.6" & E076<sup>0</sup>19'24.4"), the place selected for beehive fence experiment comes under Karulai forest Range, Nilambur South Division and is separated from reserve forest by the stream

Cheranghathodu flowing between the boundaries of forest and private rubber estates. A vast extant of rubber plantations exists adjacent to forest which helps the elephants to move out of the forest without giving attention to people. By using this rubber plantation, they can easily enter into the crop fields even if the crop is far away from the forest. The local people in the area depend more on crops like plantain (*Musa nparadisiaca*), coconut (*Cocos nucifera*), arecanut (*Areca catechu*), paddy (*Oryza sativa*), pineapple (*Ananas cosmosus*) etc for their livelihood.

## Materials and methods

Beehive fence experiment was conducted at Mayilumpara of Karulai Forest Range, where the presence of elephants was rampant in the crop field. Previous observations in this area (n=21) revealed that, elephants entered the crop field through 8 different paths and consumed the edible crops namely plantain, coconut, arecanut and pineapple. Six paths were selected randomly and blocked with the beehive fence. Three to five beehive boxes were hanged in an iron wire, supported by wooden posts (having a width of 10 m) for blocking a single path.



Plate 1-beehive fence at Mayilumpara



Plate 2-beehive box with honey bee

The remaining two paths were left as unblocked. All the twenty boxes were protected from monsoon rains using plastic sheets. Whenever the elephants touch the iron wire which is installed across the path, the beehive boxes will be disturbed and the guard bees will attack the elephants and deter them. It is a good control measure which was found effective during both day and night hours (King *et al.*, 2009). The guard bees will attack the elephants on its sensitive areas like tip of the trunk, behind the ears and around the eyes (King, 2013). The efficacy of this method was evaluated by recording the encounter of elephants through either blocked or unblocked paths. Three visits in each month were made to collect the data.

### **Result and discussion**

A total of 14 encounters were recorded in the area, of which five times through the fenced area, two times by breaking the fence and in three occasions failed to cross the fence. On all the other encounters, the elephants tried to avoid the fence by choosing a different way of entry. Every encounter was made at night which means the guarding bees were active even at night in the presence of elephants. The buzzing sound of the bees itself keep the elephant away from the fence. With the previous experience of honey bee strikes from the forest they avoided

the fence. Seventy per cent of the encounters were made by solitary male elephant, locally called as Ottakomban, which is a habituated crop raider in the area. No elephant herds of more than 4 members were recorded from the area as crop raiders or intruders to the human habitats.

After three months of installation, beehive fence showed a wide range of acceptance among the farmers living in the forest fringe areas as it is practically applicable and economically beneficial. Kerala Forest Department also installed another set of beehive fence at Panichola under Karulai Forest range by using 10 beehives on demand of the people. It is an integrated approach, so that honey is extracted and some revenue is available from the activity. Approximately 15 kg of honey was extracted from twenty beehives in the experimental site at a time.

**Table-1 Elephant encounters in the beehive fenced area**

Sl.no	Date of encounter	Place of entry	Distance covered from the RF (km)	Crops Damaged	Number of Elephant	Time of attack
1	29/03/2014	Non fenced	0.5	Pineapple	1	08.30 pm
2	05/04/2014	Fenced	0.6	Pineapple	1	10.00 pm
3	10/04/2014	Non fenced	2	Pineapple, Plantain	1	10.00 pm
4	17/04/2014	Non fenced	1	Jackfruit, Plantain	1	03.30 am
5	21/04/2014	Non fenced	3	Jackfruit, Plantain	1	02.00 am
6	19/05/2014	Fenced	5	Pineapple	1	09.00 am
7	23/05/2014	Fenced	0.01	Nil	2	03.30 am
8	21/06/2014	Non fenced	2	pineapple	1	09.00 pm
9	28/07/2014	Non fenced	3	Nil	1	04.00 am
10	10/09/2014	Non fenced	8	Arecanut , rubber	3	03.00 am
11	11/9/2014	Non fenced	6	Arecanut , rubber	3	10.00 pm
12	12/9/2014	Non fenced	3	Arecanut , rubber	3	11.00 pm
13	19/10/2014	Fenced	3	Pineapple	1	03.00pm
14	10/11/2014	Fenced	4	Pineapple	4	09.00pm

## Conclusion

Beehive fence can be effectively used as a good short term control measure against the crop raiding elephants. The small scale farmers can easily depend on this preventive method as it is easy to install and economical also.

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