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HUMAN-ELEPHANT CONFLICT IN ASIAN CONTEXT WITH SPECIFIC REFERENCE TO CROP DAMAGE

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ABSTRACT
The wide-ranging nature of Asian elephants coupled with fragmentation of their habitat has resulted in increased conflicts between these animals and humans across the country. Though several methods have been used to mitigate human elephant conflict, the incidence of crop riding is being ever increasing. In this context, the present study was carried out as a new approach towards mitigation of human elephant conflict. Elephants show highly hygienic behavioral patterns in its daily activities including eating. In the present study an attempt was made to look at the feeding behavior of elephants by spraying the elephant's urine on lure crop. It was found that, as the elephants are highly hygienic, elephants did not feed on the lure crops which were sprayed with elephant's urine.

KEYWORDS: Elephant, crop damage, feeding behavior, urine.

INTRODUCTION

The world over, large-scale loss and degradation of natural landscapes due to human activities has resulted in the reduction and fragmentation of habitat for a myriad of wild species. Such habitat fragmentation and the ensuing interspersion of human habitation and cultivation has brought wildlife into greater contact with humans, leading to an escalation in human-animal conflict, particularly in the case of large, wide-ranging mammal species such as Asian elephants (*Elephas maximus*) and African (*Loxodonta africana*)[1–5]. Conflicts between elephants and humans are now widespread across Asia and Africa [1,6–8] and represent the primary threat to the survival of the Asian elephant, a globally endangered species [8,9]. These conflicts result when elephants damage crops or property or when they accidentally kill or injure people during their movement through increasingly fragmented modern landscapes. In these encounters, elephants are often shot or wounded by humans, either in self-defense or in retaliation. Besides endangering wildlife and conservation efforts, human-elephant conflicts are also a serious threat to rural populations as conflicts often threaten the lives and livelihoods of thousands of farming families. After a detailed and complete examination of the mitigative strategies adopted to deter or repel the elephants away from the crop fields and after understanding the elephants feeding behaviour, the present study was carried out to throw light on know the effect of elephant urine on their lure and their feeding behaviour. We illustrate various experiences with the elephants and some of their peculiar behaviour's of the elephants and their foraging habit and some possible suggestions for mitigating the human-elephant conflict. The objective of the study was to understand the effect of elephant urine on the lure and their responsive feeding behaviour.

Possibility of using urine as repellent

The possibility of usage of elephant urine as repellent to the elephants is very high, because the elephants are very hygienic in their food habits or feeding behaviour except under some circumstances, but the urine would surely stop them from eating the crops, except under forced conditions.

Study location

The study was conducted on records in the Thithimathi-Aneechowkur area. This area was selected because this is one of the very high conflict areas and is also a coffee based agro forestry area which is loved by elephants because of availability of water throughout the year. The camp elephants also sometimes enter the plantations. Hence the area was selected and one more reason was, before the study is conducted with the wild elephants, we wanted to try this with tamed elephants, because the conditions would be under control and the status of the elephant will also be known, whether hungry or not and so many other condition or observations which are quite difficult in wild elephants.

METHODOLOGY

Collection of urine was done by the mahout's

The urine was collected one day before the experimental procedure was started and stored in air tight containers. Initially the concentrated urine was used and later on the urine was diluted and used in different concentrations.

Types of lures used and the reason

The types of lures selected were based on the palatability to the elephants and the lure which tempt the elephants to take risk. The lures used were***:*** *jaggery, paddy straw, paddy green with straw, bamboo seedlings or saplings, lannea branches, coffee branches with ripe berries.*

Animals used for the experiment

All the elephants which were available in the camp at the time of experimentation were used for the study. There was no specification given for selection of the experimental animals because of various reasons like the work schedule of the elephants.

Feeding of samples to experimental animals

Elephants urine was taken in a different concentrations to know the lasting effect of the urine on the lure and started process of smearing the lure and place the same in front of elephants which were quite hungry as told by the mahout.

At first instance the lure was smeared with urine at concentration of (urine) 1:0 (water) and the elephant did not even touch the lure and the same behaviour was observed for the concentration of the 1:2, but when the concentration of the urine was further diluted to 1:3 the elephants were tempted and they just smelled and touched the lure repeatedly and were very tempted and just kicked the lure away. All these happened when the lure was very freshly smeared as shown in the graph 1.

Similarly, the dry samples were smeared with the elephant urine in the same concentrations as that of fresh sample as shown in graph 2. Here again the temptations were quite high due the effect of the smell of the urine was reduced considerably at the concentration of 1:0 the elephant did not touch the lure but as the lure with dilute urine with the concentration 1:1 was placed it showed considerable change it was so tempted that it started smelling and touching the lure but did not pick it and at 1:2 concentration of the elephant picked the lure and again threw it away and when the lure which was further diluted and dried, of concentration 1:3 the elephants not only smelled and touched by but also picked and try to put in the mouth and omitted it. Therefore these results clearly indicate the feeding behaviour of the elephants and response to the polluted lure and their temptations towards highly palatable lure.

RESULTS & DISCUSSION

The behaviour of the elephants toward the lures contaminated by urine and fed to them were observed for the following feeding behaviour. This behaviour are listed below in an increasing effect of discomfort towards eating the lure.

Picked and taken into mouth and omitted (PTMO)
Picked and tried putting in mouth (PTM)
Picked and thrown (PNT)
Did not pick (DNP)
Smell and touched (SMT)
Did not touch (DT)

Effect of jaggery based lure on feeding behaviour of elephants

In this experiment, the lure used was jaggery which is simply loved by the elephants because of the sweet aroma and taste, which they simply cannot resist and go on a spree and take risk. Elephants have a very strong sense of odour and can sense the smell from kilometres together especially sweet odour. This is why elephants land up into plantations having some sweet smelling fruits like jackfruit and also land up to some of the breweries near the forest areas resulting in conflict. Hence these lures was used to know the temptations of the elephants and the amount of risk they take for the lure.

The graph very clearly shows the temptational behaviour of the elephants especially when they are hungry and their behaviour as the concentration of the urine changes as shown in fig.1 and also when the smell of the urine starts fading when the sample is dried of urine, this shows the effect of urine dryness on the lure and the probable result as shown in fig. 2.

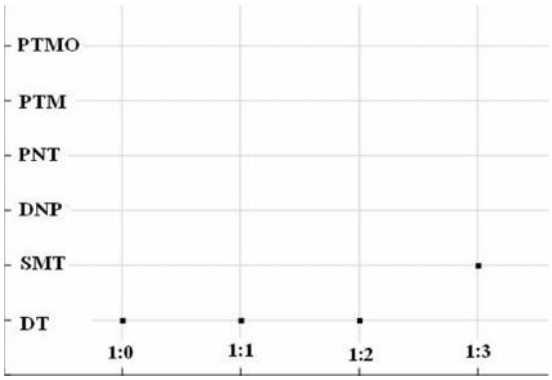

FIGURE 1. Jaggery (Wet)

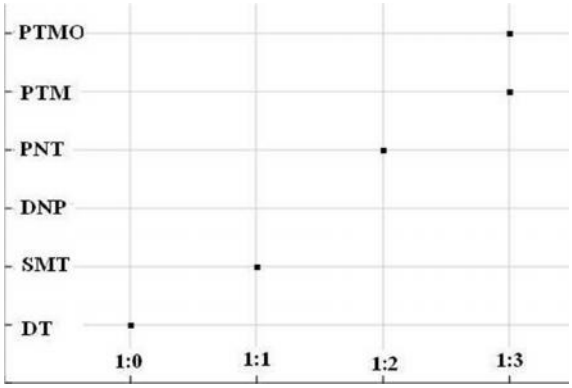

FIGURE 2. Jaggery (Dry)

(As shown in the graph, the graph is being plotted for *"the feeding behaviour of the elephants (y axis) against the concentration of urine used (x axis).*

Effect of green paddy straw based lure

Here the lure used was green paddy straw which is very nutritious and palatable than the forest grass but not very sought after. But the green carpets lure the elephants to the paddy fields were in this happen in only accidental cases, when the corridors are blocked and also because of fragmentations in the habitat and there after elephants become used to it and frequently venture into the fields not only because of this, the fields also serves as departmental stores and eases the foraging procedure of the elephants and when the elephants are really hungry they simply cannot resist the juicy lure and thus end up in conflict and risk.

The graph very clearly explains the temptational behaviour of the elephants for the polluted lure when the urine is fresh as shown in fig.3. and fig. 3&4 which shows the behaviour of the elephants to the lure with dried urine when they are really hungry and the probable results.

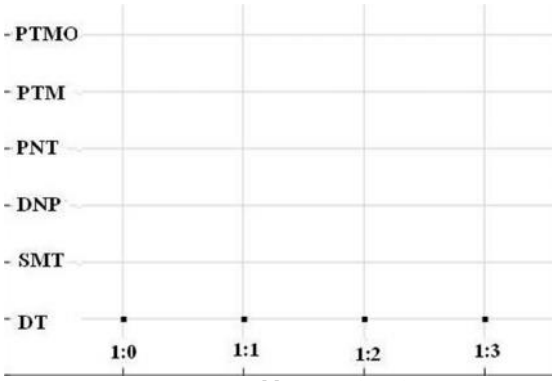

FIGURE 3. greenPaddystraw (Wet)

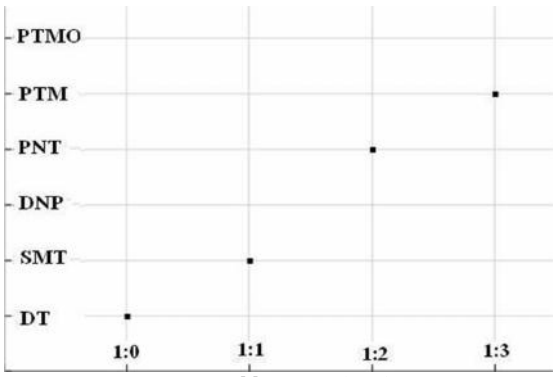

FIGURE 4. Green Paddy straw (Dry)

Effect of green milky stage paddy based lure

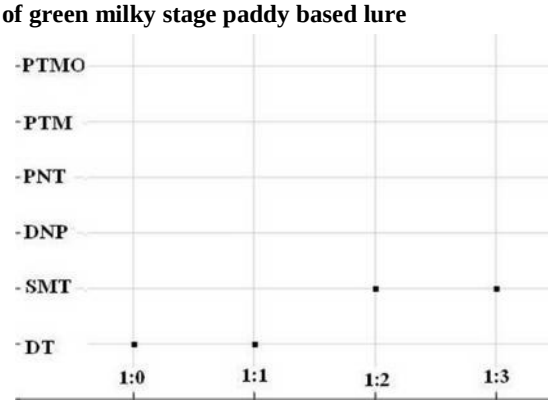

FIGURE 5. Milky Paddy with hay (Wet)

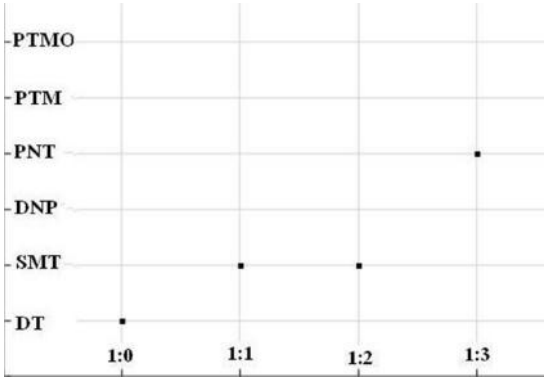

FIGURE 6. Milky Paddy with hay (Dry)

Here the lure used was the green paddy which was in a milky stage or unripe which the elephants love because of the mild sweet taste and once they taste this lure and know the palatability it almost becomes impossible to keep them at bay and the elephants start frequenting every year at the same time without a miss and get ready to take any amount of risk. Hence the lure was chosen. The graph very clearly explains the effect of urine on such a palatable lure which the elephants simply cannot resist. The fresh or wet, graph of fig.5. explains the behaviour of the elephants when the lure is polluted with urine at different concentrations which shows very high temptations and the dry or the urine dry graph of fig.6. Explains the temptations of the elephants when smell of the urine starts fading and the probable result.

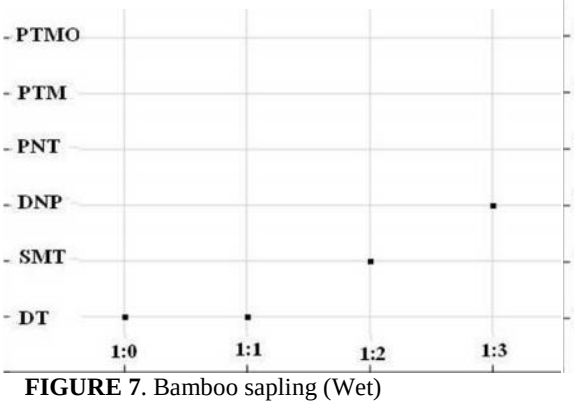

FIGURE 7. Bamboo sapling (Wet)

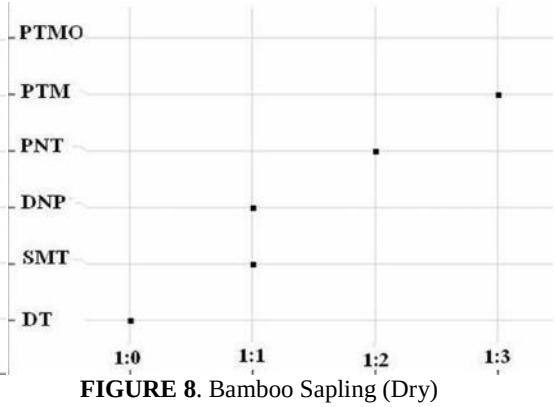

FIGURE 8. Bamboo Sapling (Dry)

Effect of bamboo saplings based lure

Here the lure used was the fresh bamboo saplings which the elephants relish without any hesitation and enjoy its palatability. Due to the increase in demand for it some plantations adjacent to the forest area also plant it which attracts the attention of the elephants and end up tasting some of the plantation crops and become frequent raiders. This gives rise to a conflict which may leads to loss of life. The graphs very clearly explain the temptational behavior of the elephants towards the lure and there aversion towards the wet polluted lure as shown in fig.7. and fig.9. This explains the behaviour of the elephants towards the urine dry lure in which the smell of the urine is faded. And the probable results are pronounced.

Effect of *Lannea coromandelica* based lure

Here the lure used were the branches of *Lannea coromandelica* which is a hot favourite of the elephants and attracts elephants because of its unique taste of mild saltiness as appeared to us. And because of this, the elephants relish the young branches of about 1-2 years old and the branches contain lots of sap which is tasty, and tempt the elephants to take the risk. The elephants pull down the young trees near the plantations and some times in the plantations if present and cause heavy damage to the plantations and put themselves in risk.

The graphs above illustrate the feeding behaviour of the elephants when the lure is smeared with urine freshly as shown in fig. 9. and fig.10. shows the feeding behaviour of the elephants when the lure is urine dried and the smell of the urine is faded and the probable results were pronounced.

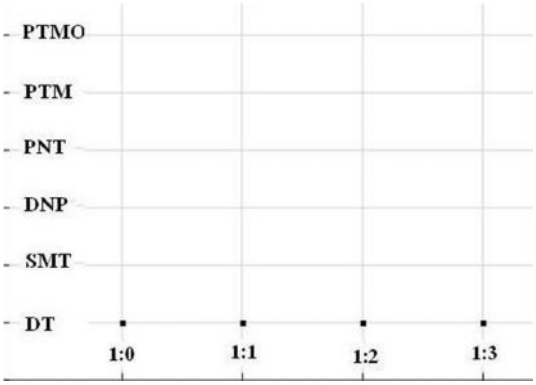

FIGURE 9. Lannea (Wet)

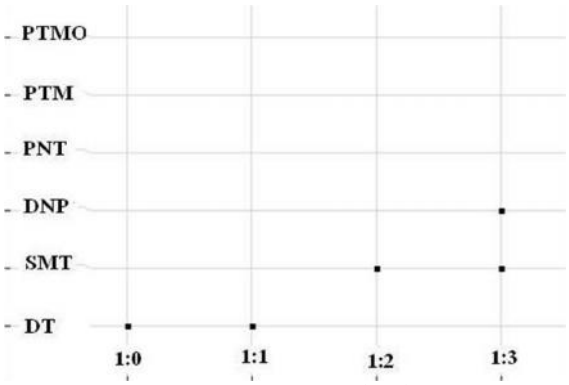

FIGURE 10. Lannea (Dry)

Effect of ripe coffee berries with branches based lure

Here the lure used were ripe coffee berries with branches, because the coffee berries when they ripe, the pulp of the berries become very sweet the elephants just chew the pulp and excrete the beans and this is a recent trend which has started just a few years back and only the elephants which get the exposure to this only try them and not all elephants. This is an alarming issue which is to be considered seriously so that all the elephants are not exposed to it. Usually elephants do not have the urge to eat coffee and enter the coffee plantations only because of the forest tree species like jackfruit and others and the other reason is the availability of water throughout the year. Because of this problem by elephants the planters remove some trees like the jackfruit which not only attracts elephants, but also other stray animals and when the elephants come in search of these tree species, they get annoyed and try out with the available forage and get exposed to coffee and take the risk.

The graph very clearly indicates the feeding behavior of the elephants when exposed to the polluted lure and the elephants are usually not tempted by coffee and only show some temptations only because of the hunger they just try it out, that too when the sample is urine dried. As shown in the fig.11 and fig.12.

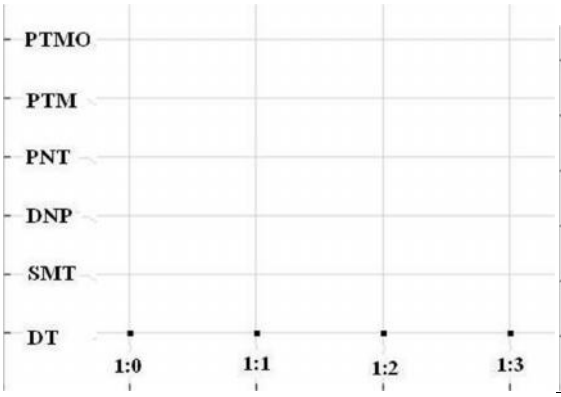

FIGURE 11. Coffee Berries (Wet)

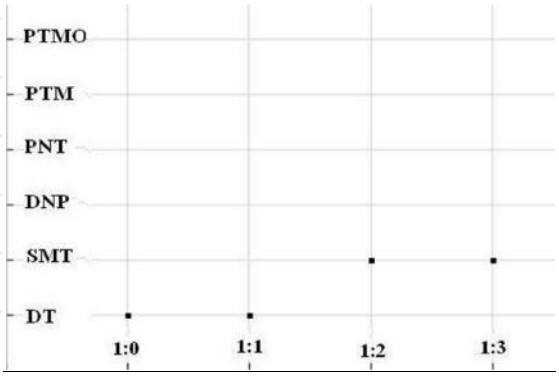

FIGURE 12. Coffee Berries (Dry)

CONCLUSIONS

The places where the elephants are exposed or have raided earlier in such places the change of cropping pattern should be discouraged, to mainly stop the elephants from the exposure to new places. Because it is almost impossible to prevent the access of the raiding elephants to such places and if any changes done, it will only lead to stress and aggressiveness in the animals and more over they will be forced to find new places and try to acclimatise themselves with the available crops.The crop compensation or enumeration to the crop damage done by the elephants should be done in a scientific manner to help the poor farmers and the enumeration of the loss is to be done by the agriculture or horticultural officers of that area and not the forest department staff, in order to pacify the farmers and make them less aggressive against the

elephants, and moreover the large corporate or companies have to be made aware and motivate them about their corporate social responsibilities and ask them to lend a helping hand, which will not only help human beings but also the animals. And thuds they play a dual role. At the same time, the elephant affected areas have to be given special attention for deterring entry using some repellents like urine based repellents. The usage of urine based repellents will also reduce the usage of chemical fungicides and pesticides and encourage the concept of organic farming and thereby enhancing the crop value.

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