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DOCUMENTATION AND EVALUATION OF TRADITIONAL METHOD OF REPELLING INSECTS IN ANIMAL SHELTERS USING NEEM AND EUCALYPTUS LEAVES

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ABSTRACT

Mosquitoes and flies lead to various vector borne diseases, create discomfort and stress to animals which in turn leads to reduction in milk production. This was the major constraint faced by the cattle rearing community of the Godavari basin. This problem was surpassed by the farmers in and around Paapi hills National Park using a simple yet very competent smoking mechanism with green leaves of Neem and Eucalyptus. It has been reported earlier that individually Neem and Eucalyptus preparations have been used successfully as fly repellant, insecticide but no literature was found regarding the use of Neem and Eucalyptus leaves smoking for repelling the flies and insects. Hence, an attempt was made to document this methodology and to prove its efficiency as fly and insect repellent. An experiment was conducted to study the effect of the smoke produced by neem and eucalyptus leaves in animal shelters. Study reveals that the percent efficiency of Neem and Eucalyptus smoke in preventing the mosquitoes and flies in the animal shelter was 73.68%.

KEYWORDS: Animal Shelter, Eucalyptus, Fly Repellent, Natural, Neem, Smoke

INTRODUCTION

Flies and insects are the serious threat to the domestic animals, as they transmit several vector borne diseases like Trypanosomiasis, Blue tongue, Anaplasmosis, Rift valley fever and Thilariasis. They are also major reason for the discomfort and stress resulting in the reduction of milk yield. Fly problem was at its zenith in the river basin areas due to the availability of water. Repellency is an important way of preventing fly and insect population. Many types of repellents are available in the market but the drawbacks with these chemical repellents are their potential toxicity to animals and bioaccumulation. They impart chemical residues in milk, meat and other animal products leading to biomagnifications. Farmers in the Godavari basin facing the same problem overcame it in natural way which was being followed since very long time, especially in the Paapi hills national park and adjacent areas. It was an alternative methodology for chemical repellents as it was environment friendly, long-lasting, cost and labour effective, easy to perform and it is need of time, as herbal repellents are gaining momentum (Verma et. al., 2013). They use Neem and Eucalyptus smoke as repellent.

Neem (Azadirachta *indica*) is a tropical or semi-tropical evergreen, draught resistant mahogany tree of family meliaceae. Neem tree has great medicinal value; it functions as anti-helmentic, anti-fungal, anti-diabetic, anti-viral and as a sedative (Achio et. al., 2012). Neem has better repellent properties it does not kill insects rather they repel them or affect their growth, it has broad spectrum repellent and pesticide properties (Ganguli, 2002). Neem leaf smoke is also known for inhibiting bacteria and cleansing the environment (Khan and Aslam, 2008).

Eucalyptus is a widely distributed tree in the deciduous forest of tropical and sub-tropical region which belongs to the family myrtaceae. It is well known for its biological properties like larvicidal, insecticidal and repellent action (Maciel et. al., 2010). Earlier studies suggest that eucalyptus provides longer protection than any other available plant based repellents (Fradin and Day 2002).

Hence, a study was undertaken on this repellent practice using smoke of Neem and Eucalyptus leaves with the following objectives

- To document the methodology.
- To understand the efficiency of the methodology.
- To popularize the importance of methodology.

METHODOLOGY

Collection of the Data

A field survey was conducted to understand the procedure of smoking. The villages of Polavaram, Singanna palli, Paidipaka of West Godavari district and Devipatnam village of East Godavari District of Andhra Pradesh, were selected for the survey. The information was sought directly from the elderly farmers in the villages regarding procedure, history and socio-economy in relation to environment. The hands on practice were undergone from the local farmers.

Procurement of the Materials

The Neem leaves and eucalyptus leaves were procured half kilogram each making total of total one kilogram. The castor oil and white cloth of one square feet area was purchased from grocery store.

Procedure of the Study

Three animal shelters with thatched roof were selected for the study. Study was conducted for 6 days in two phases, 3 days each phase. In first phase the frequency of insects in the shed were estimated without smoke and in second phase insects were estimated with smoke and the change of the insect population were estimated to record the efficiency of the smoke used.

Control

Cloth piece of 1 sq.ft dipped in castor oil was used as fly trap (Figure 1). These fly traps were tied at three different locations in shelter where insect probability was high (Figure 2). Simultaneously same procedure was carried out in three notified animal shelters in the evening before the sunset and fly traps were examined on next day morning for insects stuck to it (Figure 3). Same procedure was repeated for three days. The numbers of insects stuck to fly traps were counted and mean of three fly traps was considered as the mean of the shelter. The total mean of three animal shelters for three days was considered as overall Mean.

Figure 1: Cloth Dipped in Castor Oil

Figure 2: Trap Set in the Animal Shelter

Figure 3: Insects Adhere to Trap without Smoke

Treatment

Fly traps were fixed in animal shelters as done in control and smoking was performed. The smoking was done using neem and eucalyptus leaves in 1:1 ratio (Figure 4). Fire was initiated at the centre of the shelter using dry cow dung cakes. Fresh green leaves of 1 kg were added to the fire to create smoke and left overnight (Figure 5). The fly traps were examined in the morning after sunrise to count the total insects attached to the trap (Figure 6). Overall mean of insects was estimated as in control and compared with the overall mean of control to understand the efficiency statistically.

Figure 4: Eucalyptus and Neem Leaves Ready to Smoke

Figure 5: Smoking done Using Neem Eucalyptus Leaves

Figure 6: Trap Clean Without Insects on Next Morning after Smoking

Efficiency Rate

Efficiency rate is calculated by subtracting the total number of insects stuck before smoking and the total number of insects stuck after smoking.

Efficiency Rate = Total number of insects stuck before smoking -Total number of insects stuck after smoking

Percent Efficiency

Percent Efficiency is calculated by the ration of Efficiency rate and the total number of insects stuck before smoking by multiplying with 100.

%Efficiency = (Efficiency rate / Total number of insects stuck before smoking) x 100%

RESULTS AND DISCUSSIONS

Traditional methodology of smoking using neem and eucalyptus was cost effective and safe. Smoking was commenced in the animal shelters at evening hours by controlled burning of both leaves in equal ratio until the leaves burnt completely.

We here report the efficiency of applied smoke in repelling the flies and insects in animal shelters. The study conducted reveals that smoke of neem and eucalyptus has reduced the insect population by 78.68% when compared with the control.

From the study it was observed that mean of insects without smoke in shed 1, shed 2, and shed 3 were 89.55, 80.66, and 88.10 respectively (Table 1). After smoking the mean of insects recorded in shed 1, shed 2 and shed 3 were 21.77, 23.22, and 23.00 respectively (Table 2). This depicts a rapid decrease in the insect population after using smoke (Figure 7). The efficiency rate and percent efficiency of smoking were recorded as 63.44 and 73.68% respectively and similar to Boadu et. al., 2011)

Table 1: Mean ±S.E of the Number of Insects before Smoking

	Shelter 1	Shelter 2	Shelter 3	Overall mean
Day 1	91.00	71.33	93.33	85.22 ± 6.97
Day 2	89.66	82.33	78.66	83.55 ± 3.23
Day 3	88.00	88.33	92.33	89.55 ± 1.39
Overall mean	89.55 ± 0.86	80.66 ± 4.97	88.1 ± 4.72	86.10 ± 2.42

Table 2: Mean ± S.E of the Number of Insects after Smoking

	Shelter 1	Shelter 2	Shelter 3	Overall mean
Day 1	23.66	27.00	26.33	25.66 ± 1.01
Day 2	20.66	16.00	17.33	18.00 ± 1.38
Day 3	21.00	26.66	25.33	24.33 ± 1.71
Overall mean	21.77 ± 0.94	23.22 ± 3.61	23.00 ± 2.87	22.66 ± 1.37

The active ingredients in the neem smoke are azadirachtin, salannin, nimbin, nimbidinin, azadiradione, meldenin, nimboninnvepenin and mahmoodin (Schmutterer, 1990 and Bashir, 1994). These were active against different insects and various pests through their repellent, anti-feedent, growth regulatory and toxic effects Satti et. al., 2013; Dreyer, 1984 and Ketkar et. al., 1987). Neem was also capable of hormone mimicking activities thus interfering with parasitic lifecycle inhibiting the ability to feed as well as preventing the hatching of eggs (Kumar and Navaratnam, 2013). Neem was also proved as effective anti-bacterial (Khan and Aslam, 2008). Combinations of all these effects make Neem smoke an efficient repellent. Functional constituents present in eucalyptus were Z-citralal, α-citral, 1-8 cineoles and citronellal, citronellal and 1-8 cineole, which are responsible for acaricidal action of the eucalyptus. α- pinene has shown fumigant toxicity as well as repellency against several species of insects and mites (Traboulsi et. al., 2002) through inhibition of neurotransmitter acetyl choline esterase (Liu et. al., 2014). Eucalyptus is known for its long lasting effect as a repellent than any other known plant repellent. Eucalyptus is also known for antimicrobial, antifungal and anti malarial activity (Liu et. al., 2014). Due to these properties eucalyptus used in the smoking was of great importance to animal health beyond the mere repellent.

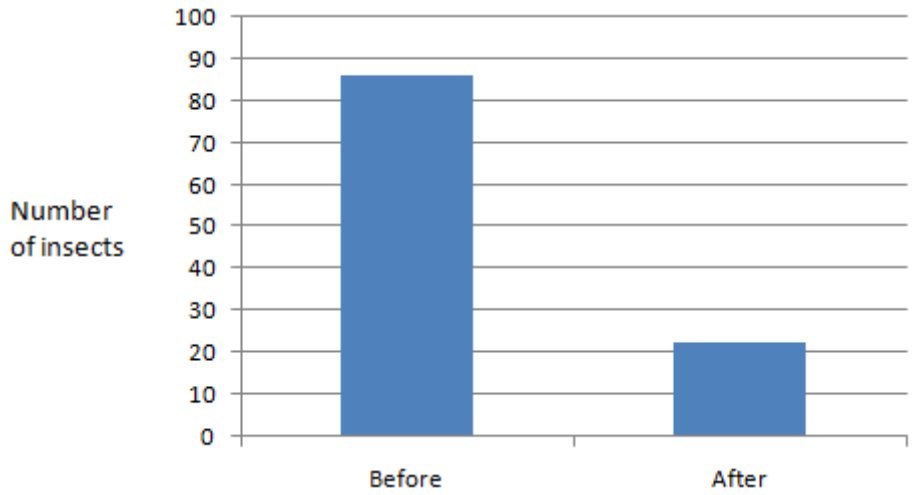

Figure 7: The Graph Depicting the Number of Insects Trapped Before and After Smoking

CONCLUSIONS

Neem and Eucalyptus are known for their multiple benefits to the mankind. One of the easy ways to utilize them was smoking. Their smoke was found to be very effective as an anti-bacterial, fly repellent and insecticide which has been proven scientifically. The organic components in Neem and Eucalyptus were known for their repellent activity than killing the insects, protecting the delicate ecological diversity and also preventing the bio-magnification which was inevitable with the use of chemical repellents; these factors make this smoke bio-friendly and safe. It was economical, as reducing the insect population avoids vector borne diseases and stress, increasing the milk yield at zero cost. Such a rare valuable traditional knowledge deserves documenting and exploring.

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