

## A Novel Approach to Develop Safe & Eco-Friendly Herbal Mosquito Repellent

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### ABSTRACT

There are really only two reasons to control mosquitoes; to avoid nuisance biting, and to preclude the spread of mosquito-borne disease. Everyone recognizes that mosquitoes can be a real nuisance, but most people do not realize the magnitude of the health threat that they represent. Some of the world's most dreaded diseases are known to be carried and transmitted by mosquitoes. Many countries around the world are ravaged yearly by malaria, yellow fever, and dengue-hemorrhagic fever. According to the World Health Organization mosquitoes infect over 300 million people a year with Malaria and Dengue, just two of the life threatening diseases mosquitoes can carry. Most of the people have aversion over the use of present synthetic mosquito repellent due to its unacceptable smell and highly poisonous to human due to its chemical pesticide. Apart from this it causes bronchial congestion to bronchitis patients and children. The prolonged use of synthetic mosquito repellents shows other side effects like neurotoxicity and altered immune system. Hence the main objective of this project is to produce an organic and novel product which is cost efficient and eco-friendly. For this many herbs have been tried such as Lemon, Nochi, Marigold, Datura and Neem. To have effective pesticide action without creating any problem to human, apart from this the plants included can remove the bronchial congestion so that both bronchitis patients and children would feel comfortable. Through many trials carried out it is very clear that kaduka gives excellent binding to bring out desired shapes of the proposed mosquito repellent. The prepared pellets were tried on mosquitoes kept in specially fabricated mosquito cage. The results are quite interesting to note that it completely keeps away the mosquito which is evidenced by concentration of mosquitoes towards the corner of the cage which indicates the repellent action of discovered mosquito pellet. The study can be further extended to screen the toxic effect through animal studies to bring it as a potent safe and eco-friendly mosquito repellent.

Keywords: neurotoxin, hazards, eco-friendly, eradicate, mosquitoes

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### INTRODUCTION

Mosquitoes act as vectors for many disease-causing viruses and parasites. At least two million people annually die of these diseases, and the morbidity rates are many times higher still. According to the World Health Organization mosquitoes infect over 300 million people a year with Malaria and Dengue, just two of the life threatening. Repellents are the first line of defense against mosquito bites. In India synthetic mosquito repellent coil are widely used. The prolonged use of synthetic mosquito repellents shows many side effects. Plants are rich source of bioactive organic chemicals and offer an advantage over synthetic pesticides as these are less toxic, less prone to development of resistance, and easily biodegradable. Many of the herbs and shrubs are found to have promising medicinal properties, mosquito larvicidal and mosquito repellent properties. Plants have also been used for centuries in the form of crude fumigants where plants were burnt to drive away nuisance mosquitoes and later as oil formulations applied to the skin or clothes (Marta Ferreira Maia *et al.*, 2011). Some indigenous plant based products are very promising against mosquitoes [Ansari, M. A *et al.*

2000] and can be used as insecticides and/or repellents. They offer a safer alternative to synthetic chemicals and can be obtained by individuals and communities easily at a very low cost. Hence the present study is designed to develop herbal safe cost effective eco-friendly mosquito repellent.

### MATERIALS AND METHODS

The five type of leaf samples of medicinal origin such as Neem, Nochi [Vitexnegundo] [pesticide activity], Marigold [larvicidal], Datura [bronchodilator] to release sputum from congested lung [Priyanka *et al.* 2012] and Lemon apart from its anti-bacterial activity it emits pleasant odour due to the presence of volatile oil were collected from local areas. Cow dung and cow urine was obtained from local cow sheds to ferment the preparation [Malar J. 2011]. The leaf powders were mixed according to 5 different formulation [Table 1] with charcoal, cow dung and cow urine in the pots to ferment the preparation [Kaliyaperuma *et al.* 2014]. By using kadukai which is proved to be a good binding material is mixed with the preparation to make cylindrical shape of mosquito repellent as a pilot study. The pilot material is sun

Table 1: Formulation of leaf in each mud pot.

Sample	Neem (grams)	Dhatura (grams)	Marigold (grams)	Lemon (grams)	Nochi (grams)
A	10	10	10	10	20
B	10	10	10	20	10
C	10	10	20	10	10
D	10	20	10	10	10
E	20	10	10	10	10

dried. Addition of myrabalan and saw dust increased the binding capacity of the pellet and improved the ignition.

Rearing of mosquitoes and testing: More than 1500 mosquito pupae were allowed grow in the mosquito rearing cage. Nutrient provided was 10% sucrose solution. The cage was closed on all sides with paper leaving an opening on the top to allow sunlight. The efficacy of the product was observed on the mosquitoes on the third day on the adult mosquito. [Jeroenetal 2005]

### RESULTS AND DISCUSSION

The ignited 5 types of [A, B, C, D, E] pellet when they are introduced in the cage containing mosquitoes showed rapid swirling movement immediately. after ignition. After 15 minutes the mosquitoes were seen to repel away from the product and accumulate near the opening at the top of the test cage where there was provision for sunlight through the netted enclosure. After 30 minutes in the sample A,B and C showed anaesthisng effect on mosquitoes were observed..After 1 hour of removal of the pellet: the repellent effect start gradually reducing resulted in gradual regain of consciousness among the affected mosquito. Hence bio-insecticides may serve as suitable alternative to chemical insecticides in future as they are relatively safe, inexpensive and available everywhere in the world. Although it shows repellent effect for mosquito but it is still quite comfortable for human because it emits pleasant odour having medicinal effect because datura in the combination known to have bronchodilator effect hence the fumes give complete relief for asthma and bronchitis patients. This work form a base for the further

biotechnologist to develop quite efficient, safe and eco friendly mosquito repellent in future.

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