

Formulation of Herbal Mosquito Repellent from *Laurus nobilis*, *Ocimum sanctum*, *Azadirachta indica*

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Abstract:- Mosquitoes are one of the deadliest insects in the world Which cause number of vector-borne diseases(e.g Dengue, malaria, Zika virus fever, yellow fever, West Nile fever, Japanese encephalitis) in human being. this vector borne diseases cause millions of death every year in the world, the chemical based mosquito repellents available in the market contain some hazardous chemicals which are likely to cause threat to human being. According to report After using chemical based mosquito repellents, 11.8% people complained of various health issues like breathing problems, headache, irritation in the eyes, bronchial irritation, cold , cough, running nose and skin infections. some of them also developed asthma after using these repellents. So, use of herbal mosquito repellents are one of the option to overcome the problems of chemical based Mosquito Repellents. herbal mosquito repellents are effective, eco friendly and cheaper as compared to chemical based Mosquito Repellents.

Keywords:- Herbal, Safe to Use, Mosquito Repellent, Cost effective etc.

I. INTRODUCTION

Mosquitoes are responsible for various vector borne diseases including dengue, malaria, Zika virus fever, yellow fever, West Nile fever, Japanese encephalitis etc. According to WHO more than half of world population live in area where Mosquito species are present and their ability to carry and spread disease to humans cause millions of death every year. there are different types of Mosquitoes and some of them have ability to carry different diseases.

The different types of Mosquitoes and diseases caused by them are given below:

➤ *Aedes Mosquito:*

Aedes Mosquito cause Dengue fever, yellow fever, West Nile fever, Zika virus etc. white and black markings on their legs and body are main identification of them.

➤ *Aedes albopictus:*

Aedes albopictus (Asian tiger)responsible for number of viral pathogens Such as yellow fever virus, Zika fever, dengue fever as well as some filarial nematodes e.g. *dirofilaria immitis* They found in tropical and subtropical areas of south east Asia.

➤ *Marsh Mosquito (Anopheles Mosquito):*

They are responsible for malaria, brain tremor, *dirofilaria immitis*, they occurred in Colder climates, tropical areas, commonly found in sub Saharan Africa .

➤ *Yellow fever Mosquito:*

they cause disease like dengue fever, Zika fever, yellow fever etc. this Mosquito first occurred in African countries and now occurred in tropical and subtropical regions of the world.

❖ *Lifespan (Life cycle) of Mosquito:*

The period of the Mosquito life cycle depend upon the types of Mosquito. lifespan also alter due to the changes in environmental conditions such as moisture & temperature. However, All species of Mosquito follow four different stages in their life cycle. These are

- egg
- larva
- pupa
- Adult stage

Life cycle of mosquito

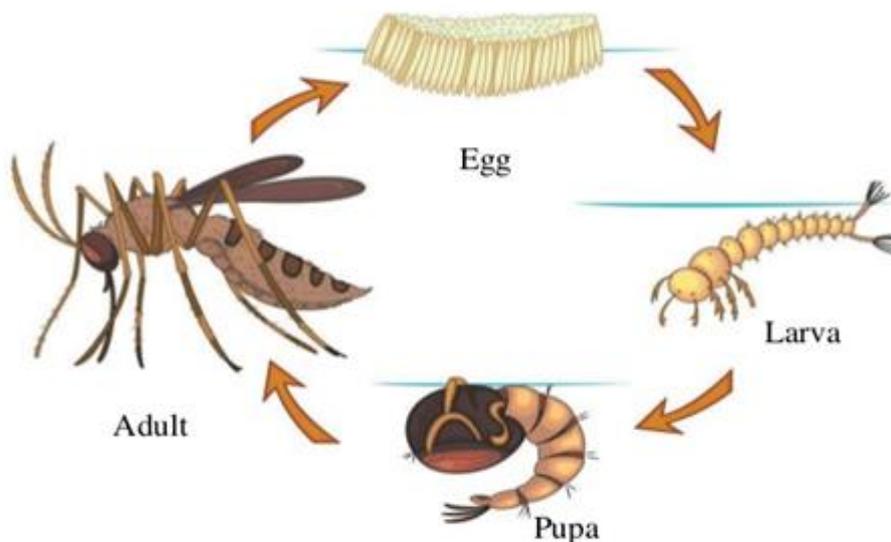


Fig 1

To get rid from Mosquitoes there are various types of repellents available in the market but they have high potential to cause various harmful effects on human being. There are also some natural ingredients which are useful to get rid from Mosquitoes which does not cause any problems to human health.

II. MATERIAL AND METHODS

➤ *Tulsi (Ocimum sanctum):*

Tulsi is most commonly used medicinal plant in Indian homes. Each part of the plant i.e. stem, leaves, seeds, root, flower or whole plant is known for its medicinal properties. The plant is recommended for the treatment of various diseases like cough, sore throat, kidney stone, eye disorder, respiratory disorders, and stress and also used to get rid from mosquito. Tulsi (*ocimum sanctum*) collected from the botanical garden of department of botany Shiva trust and leaves were transferred into polythene bag and washed before being dried and the process of drying was carried out slowly to prevent the loss of desired active ingredients.



Fig 2

➤ *Neem (Azadirachta indica):*

Azadirachta is a powerful insect anti-feedant that interrupts metamorphosis as a moth larva at extremely low concentration. It has also been seen that besides azadirachtin, salanimsalanin, gedunin, azadinone, nimbin, nimbidine, nimbicidine, nimitinol are also important limonoids which have an excellent effect on insects and pests. The active ingredient of *Azadirachta indica* inhibits the growth of insects because it shows an effect on their life cycle. Fresh Neem leaves were collected from the herbal garden of Pratibhatai Pawar College, Shrirampur and washed them with tap water and followed by drying them in sunlight for consequently four days.



Fig 3

➤ *Saw dust:*

Saw dust is used in formulation to enhance the combustion process in Dhoop. Saw dust is collected from a local saw mill and it is passed through a 40 mesh sieve to get fine particles.

➤ *Loban (Frankincense):*

Loban(Raal) is an aromatic resin used in incense and perfumes, obtained from trees of the genus *Boswellia* in the family *Burseraceae*. It is a well known natural insecticide And an excellent repellent of insects and mosquitoes. Loban was obtained from local shop And the process of grinding was carried out by hammer mill and product was passed through 60 no sieve to get small particles only.

➤ *Peppermint essential oil:*

Peppermint oil (*Mentha* oil) has a sharp, menthol smell, clear to pale yellow in colour and watery in viscosity, peppermint oil (773 enthe oil) is obtained by steam distillation of peppermint (*Mentha arvensis*) leaves under normal laboratory condition. About 8g oil was extracted by steam distillation from the fresh plant leaves.

➤ *Lemongrass essential oil:*

The odour of lemon grass is similar to that of lemon because they contain an essential oil having citral as main constituent, same as what is present in lemon peel. The main constituents in lemongrass leaf are dipentene, terpineol Limonene, citronellol, terpineol, methyl heptenone, dipentene, geraniol, limonene, nerol, farnesol. The lemongrass essential oil obtained by steam distillation using n hexane as a solvent about 19ml of oil, weighing 8.2g, was extracted and stored in the refrigerator at 6°C.

➤ *Camphor:*

Camphor like eucalyptus, citronella and similar plants, camphor is a natural mosquito repellent. It simply has an odour which repel mosquitoes away. Burning of camphor in a closed room creates an acrid smoke which is a potent deterrent.

➤ *Eucalyptus essential oil:*

The Centre for Disease Control and Prevention (USA) have approved eucalyptus oil as an effective ingredient in mosquito repellent. A recent study showed that a mixture of 3 percent lemon eucalyptus oil provided more than 95 percent protection against mosquitoes for three hours Eucalyptus oil obtained from Nilgiri touch co.pvt ready use for the formulation.

➤ *Cow Dung :*

Cow dung contains plenty of Ammonia, Menthol, Phenol, Indole, Formalin and specially its bacteriophage eradicate the pathogens and are recognised disinfectant. cow dung collected from local cow farm. it was placed expose to air for two days and moisture removed from it.



Fig 4

➤ *Maida:*

Maida is used as binder. It has good binding property. Maida gives excellent binding to all the ingredients.

➤ *Bay leaves:*

Bay leaves have a pleasant aroma, but mosquitoes and other insects hate it. The large bay leaves were converted into small particles with the help of grinder and was passed through 60 no sieve to ensure small particles.



Fig 5

➤ *Clove:*

The smoke which generates from burning of clove is helpful to get rid from all three species of mosquito and clove oil give the longest duration of repellency 2-4 hours.

III. PROCEDURE

For preparation of herbal mosquito repellent Dhoop, the dried tulsi leaves (7.05%), bay leaf (8.40%) and neem leaves (11.22%) were mixed with Loban (5.32%), maida (5.63%) clove (1.98%) and saw dust (6.38%), After mixing, dried cow dung (42%) and camphor (2.14%) were added in above mixed material. Half of All essential oils used in formula were added (eucalyptus essential

oil(1.57%) peppermint essential oil (1.15%) lemongrass essential oil (2.22%)) At the end small quantity of water was added to improve binding capacity of maida and Above mixture converted into desired shape of Dhoop using mould and was allowed to dry by placing exposed overnight. Finally remaining quantity of essential oils were sprayed on dhoop and dried in hot air oven at 120°C for 15 minutes.

➤ *Formula 1**:

Sr.No.	Ingredients	Parts (percent)
01	Neem Leaves	11.22
02	Cow Dung	42
03	Lemongrass Oil	4.44
04	Saw Dust	6.38
05	Loban(Raal)	5.32
06	Mint Oil	2.30
07	Maida	5.63
08	Eucalyptus Oil	3.14
09	Camphor	2.14
10	Bay Leaf	8.40
11	Clove	1.98
12	Tulsi	7.05

Table 1

➤ *Formula 2:*

Sr.No.	Ingredients	Parts (percent)
01	Neem Leaves	10.12
02	Cow Dung	46.0
03	Lemongrass Oil	3.08
04	Saw Dust	3.24
05	Loban(Raal)	4.22
06	Mint Oil	3.08
07	Maida	6.12
08	Eucalyptus Oil	3.10
09	Camphor	2.25
10	Bay Leaf	14.0
11	Clove	1.60
12	Tulsi	3.15

Table 2

❖ *Percentage of Ingredients:*

➤ *Formula 1:*

Formulation of mosquito repellent

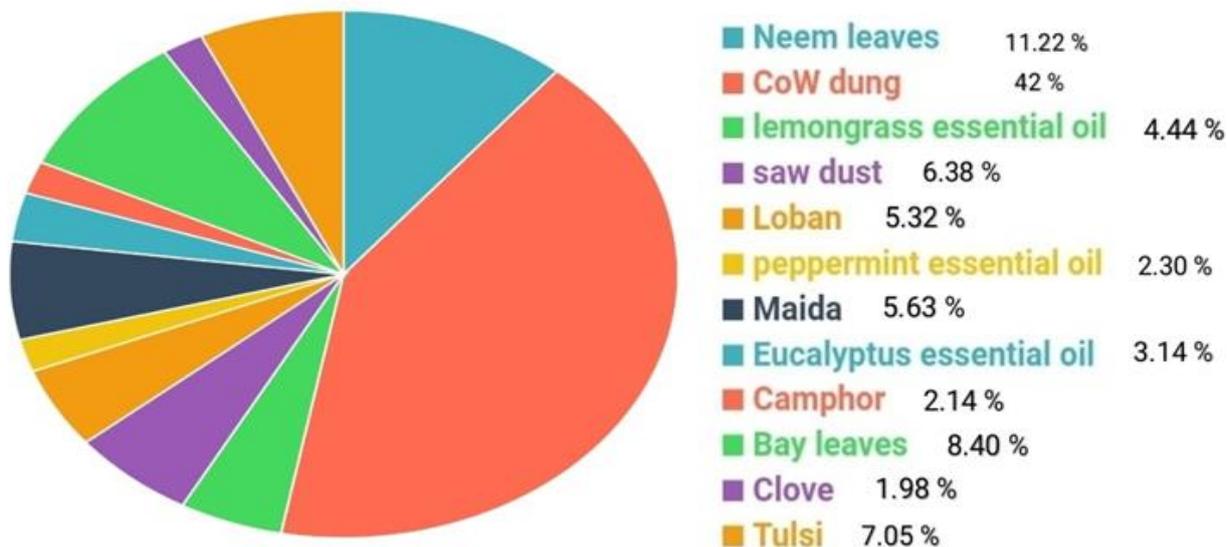


Fig 6

➤ *Formula 2:*

Formulation of mosquito repellent

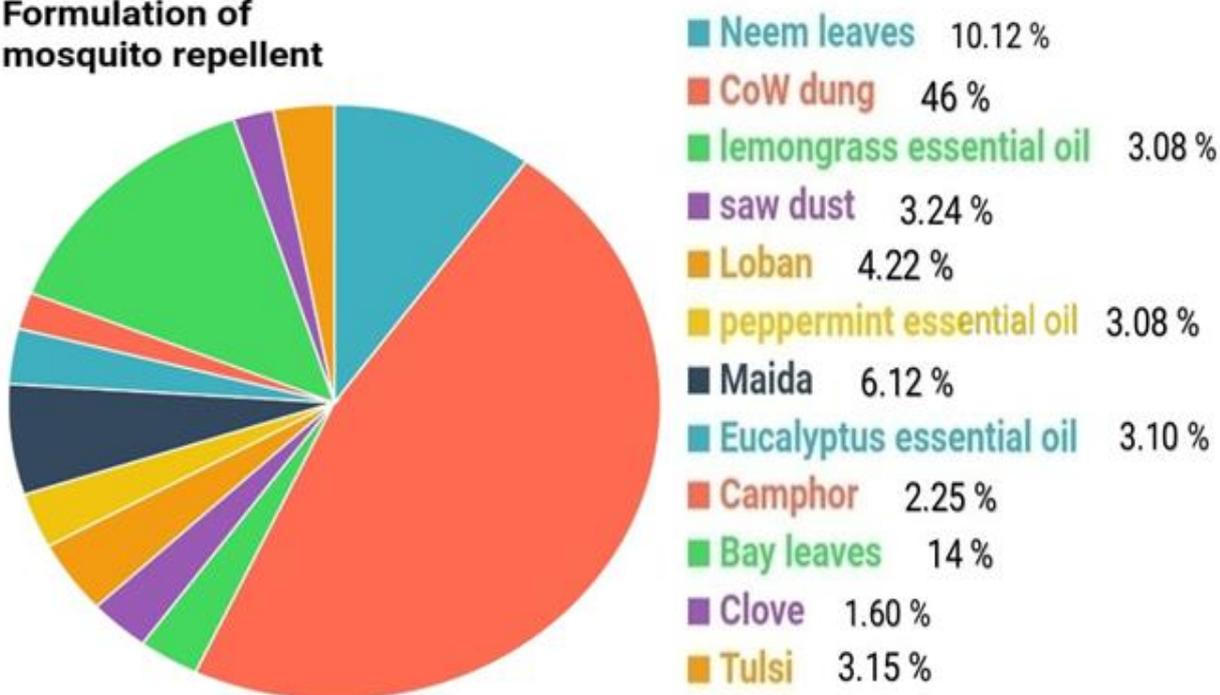


Fig 7

comparative efficacy of Two herbal mosquito repellent with time

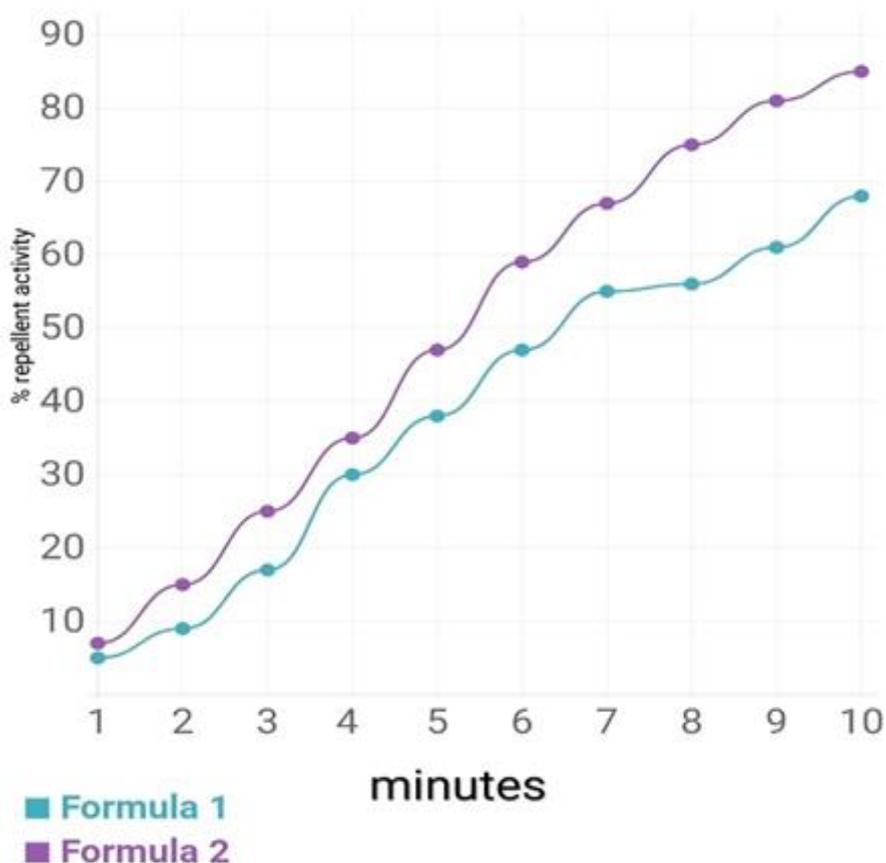


Fig 8

IV. RESULT AND DISCUSSION

Mosquito repellent prepared with different quantity of ingredients was given for use to people of different colonies in Shrirampur. The testing of both formulation conducted in a group of 30 people to check the mosquito repellent activity of both formulation. About 70% people found that formulation 2 is more helpful to repel Mosquitoes than formulation 1 and just 30% people found formulation 1 more helpful to repel Mosquitoes than formulation 2. To compare effectiveness of both formulation we used both formulation in different area and we also found that formulation 2 is more effective than formulation 1.

V. CONCLUSION

Both formulation found quite efficient to repel Mosquitoes but formulation 2 found more effective than formulation 1. It may be due more amount of bay leaves in it. This study resulted in development of herbal mosquito repellent which is safe for human without any side effect and results of this study indicated that the bay leaves based mosquito repellent could be beneficial for the control of mosquito.

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